United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, CA 95825-1846

IN REPLY REFER TO:
1-1-02-F-0002

October 29, 2001

Mr. Michael G. Ritchie,
Division Administrator
Federal Highways Administration
980 Ninth Street, Suite 400
Sacramento, California 95814-2724

Subject: Formal Endangered Species Consultation for the Proposed San Francisco-Oakland Bay Bridge East Span Seismic Safety Project, Alameda County, California (FHWA Reference # HDA-CA; 04-SF-80; P37151)

Dear Mr. Ritchie:

This is in response to your request (October 11, 2001) for formal consultation with the U.S. Fish and Wildlife Service (Service) on the proposed San Francisco-Oakland Bay Bridge East Span Seismic Safety Project (East Span Project), Alameda County, California. This request for initiation of formal consultation was received by the Service on October 11, 2001. This document represents the Service's biological opinion on the effects of the action on the California least tern (*Sterna antillarum browni*)(least tern) and California brown pelican (*Pelecanus occidentalis californicus*) (brown pelican), in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act).

After review of the species list for the project areas (Enclosure A), we have determined the only species under jurisdiction of the Service that may occur in the proposed action area are the endangered least tern and endangered brown pelican. No critical habitat has been designated for the least tern and brown pelican; therefore, none will be adversely modified or destroyed by the East Span Project.

This Biological Opinion is based on information provided: (1) in the *Draft Endangered Species Act- Section 7 Consultation Section in Support of the Biological Opinion for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project*, U.S. National Marine Fisheries Service (NMFS), October, 2001; (2) in the document, *San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Underwater Sound Pressure Attenuation Alternatives Considered and Rejected*, Caltrans, dated October 2001; (3) in the document, *Proposed Construction Impact Avoidance and Minimization Measures Regarding the Interaction Between Fish and the Sounds*

from Plie Driving While Building the New San Francisco-Oakland Bay Bridge, prepared by Charles R. Greene, Jr., PhD (Greeneridge Sciences, Inc.), September 30, 2001; (4) in the document, *Effects of the Proposed Actions Regarding the Interaction Between Fish and the Sounds from Plie Driving While Building the New San Francisco-Oakland Bay Bridge*, prepared by Mardi C. Hastings, PE PhD (Ohio State University, Columbus, OH), September 30, 2001; (5) in the document, *The Effects on Fish and Other Marine Animals of High-Level Underwater Sound*, prepared by AWH Turnpenny, BSc PhD MIFM C Biol FI Biol, K P Thatcher *BSc*, R Wood, BSc PhD, and J R Nedwell, BSc PhD MIOA MSUT (Subacoustech Ltd), October 1994; (6) in the *San Francisco-Oakland Bay Bridge East Span Seismic Safety Project Pile Installation Demonstration Project Fisheries Impact Assessment*, prepared by Robert Abbott, PhD, Strategic Environmental, Michael W. Davis, Parsons Brickeroff, and Steven Hulsebus, Caltrans District 4, August 2001; (7) *Volume I, Biological Assessment for the Berths 55-58 and Oakland Harbor Navigation Improvement (-50') Projects* prepared by Entrix, Inc. and dated December 9, 1997, and revised on April 24, 1998; (8) *Volume II, Biological Assessment for the Berths 55-58 and Oakland Harbor Navigation Improvement (-50') Projects* prepared by Entrix, Inc., dated December 9, 1997, and revised in April 1998; (9) the *Draft Fish and Wildlife Coordination Act Report for the Oakland Harbor 50-foot Navigation Project* prepared by the Service and dated March 1998; (10) in the *Endangered Species Formal Consultation for the Proposed Oakland Harbor Minus 50-foot Navigation Improvement and Vision 2000 Projects, City of Oakland, Alameda County, California,* reference # 1-1-98-F-43, prepared by the Service, June 1999; (11) in the document, *Least Tern Foraging Ecology at Three Major California Breeding Colonies*, provided in Western Birds, Volumne 14, Number 2, 1983, authored by Jonathan L. Atwood and Dennis E. Minsky; (12) in the *Characteristics of California Least Tern Nesting Sites Associated With Breeding Success or Failure, With Special Reference to the Site at the Naval Air Station, Alameda* report prepared by Dr. Carolee Caffrey and dated August 26, 1995, (Caffrey Report); (13) in the proceedings for *A Scientific Symposium: Alameda Naval Air Station's Natural Resources and Base Closure on March 12, 1994* prepared by the Golden Gate Audubon Society (Symposium Proceedings); (14) in the Service's Biological Opinion issued on June 26, 1997, for the disposal of the U.S. Navy's former FISCO facility (Service file number 1-1-97-F-85); (15) information in Service files; and (16) additional oral, electronic, and written communications between the Service and Caltrans and/or their consultants. A complete administrative record of this consultation is on file in the Service's Sacramento Fish and Wildlife Office (SFWO).

CONSULTATION HISTORY

On July 21, 1999, the Service received the FHWA/Caltrans[1] Environmental Impact Statement/ Environmental Impact Report for the East Span Project.

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[1] FHWA and Caltrans are jointly implementing planning and construction activities associated with the East Span Project. Caltrans has been, and will continue to, act as an applicant with FHWA for associated project-related consultation under the Act. While some items identified as FHWA/Caltrans in this opinion may have been or are being undertaken separately by FHWA or Caltrans, they are identified as joint activities as a result of Caltrans' applicant status under the Act.

On October 11, 2001, FHWA/Caltrans initiated formal Section 7 consultation under the Act with the Service.

BIOLOGICAL OPINION

Description of Proposed Action

This Biological Opinion addresses activities proposed by FHWA/Caltrans to assure seismic safety for the East Span Project. It was determined the existing East Span of the San Francisco-Oakland Bay Bridge must be replaced or retrofitted because: (1) it is not expected to withstand a maximum credible earthquake (MCE)[2] on the San Andreas or Hayward faults; (2) it does not meet lifeline criteria for providing emergency relief access following an MCE; and (3) it does not meet current operational and safety design standards. Associated actions include new bridge construction, dismantling of the existing bridge, and proposed impact avoidance, minimization, and compensatory measures. Project construction will occur over a seven-year period, including five years to construct the new bridge and two years to remove the existing East Span. FHWA/Caltrans intends to open bids on the Skyway contract on November 14, 2001, and award that contract shortly thereafter.

The project would require the use of large-scale equipment and involve labor-intensive activities. Materials and equipment would arrive to the site by land and water and dredging of approximately 615,000 cubic yards of Bay mud and soil will be required.

Location

The East Span Project site is located in San Francisco Bay, between Yerba Buena Island (YBI) and Oakland (Figure 1). The **project construction limits** are shown in Figure 2 and begin at latitude N37-48-35.47 and longitude W122-21-57.65 (defined by U.S. Reservation Monument #102 (Granite) near the midpoint of the YBI tunnel) and end at latitude N37-49-14.71 and longitude W122-19-48.74 (defined by National Geodetic Survey or N.G.S. point [Mole] near the Pacific Gas & Electric [PG&E] substation on the Oakland side). The in-Bay portion of the East Span Project site includes the area around the bridge piers and the area necessary to accommodate construction-related equipment such as work barges and cranes.

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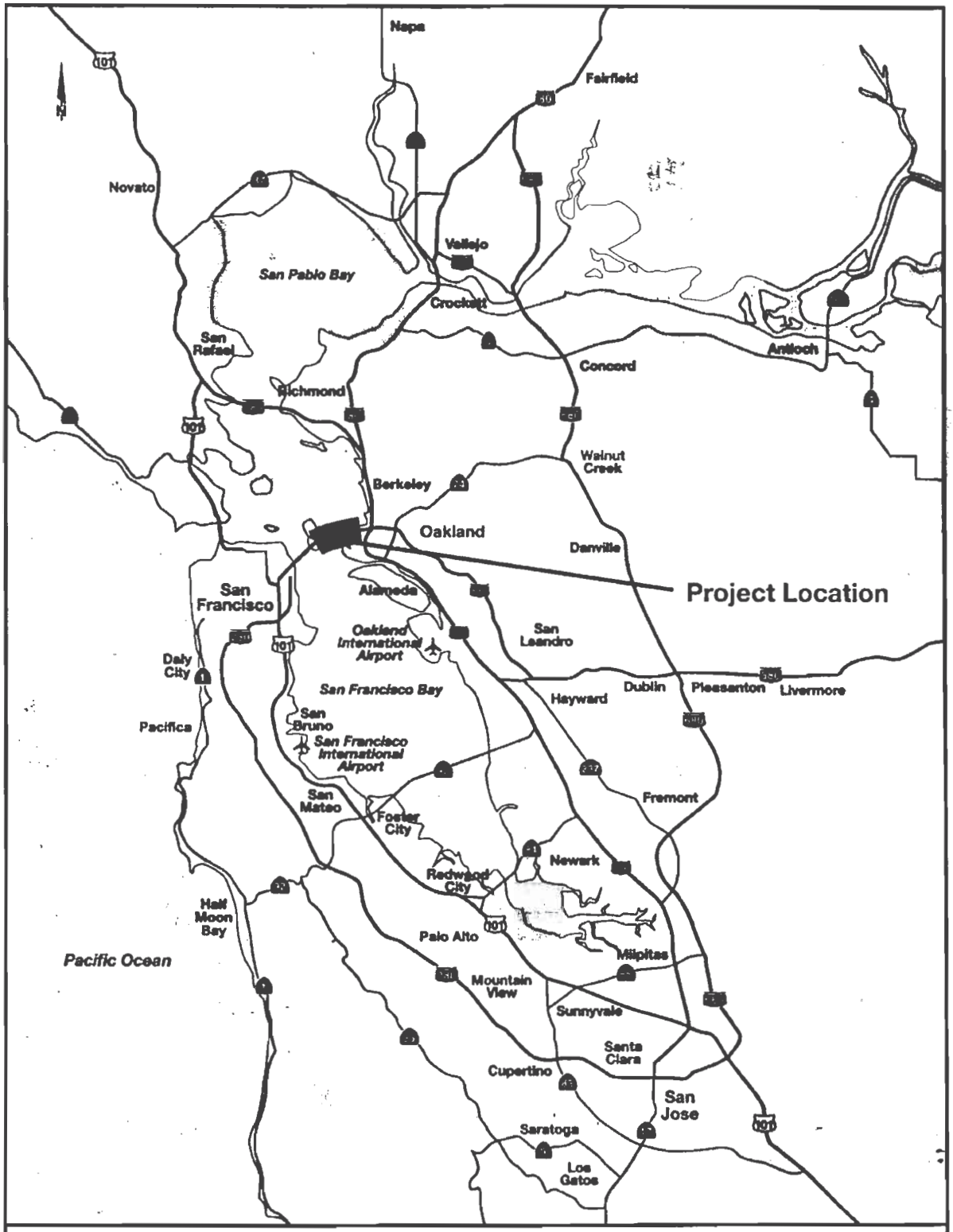
[2] An MCE is the largest earthquake reasonably capable of occurring, based on current geological knowledge. FHWA/Caltrans has projected the MCE for the San Francisco-Oakland Bay Bridge East Span as an earthquake of magnitude 8 (Richter scale) on the San Andreas fault or 7.25 on the Hayward fault.



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT

Project Location

Figure 1

For the purposes of this consultation, the **consultation project limit**[3] encompasses central, north, and south San Francisco Bay, bounded by the towns of Napa and Sonoma; the Golden Gate Bridge; Hwy 880, Alameda County; and Moffett Field NAS, Santa Clara County.

New Bridge Construction

The new bridge will be constructed north of the existing East Span and will be approximately 2.18 miles long (3.5 kilometers long) and approximately 230 feet wide (70 meters wide), including a 50-foot (15.3-meter) minimum space between the east and westbound bridge decks. The East Span Project would also replace the eastbound on-ramp on YBI. The existing ramp would be dismantled to construct the new bridge. The ramp would be rebuilt and would meet current design and safety standards.

The new structures and roadway consist of a viaduct from the YBI tunnel to a self-anchored suspension span (SAS), the SAS or main span, a skyway from the SAS to the Oakland approach, and a geotechnical approach embankment and roadway at the Oakland Touchdown. The structures would be supported by 33 piers over water and 33 bents set on YBI and the Oakland Touchdown area (Figure 3). The construction schedule would be determined after contract award by the selected construction contractors.

Main Tower

The main tower would be set offshore from YBI at a water depth of 59 feet (18 meters). Bedrock at the main tower location is sloping. The contractor may choose to create a bench for the main tower by mechanically breaking or excavating rock to create a level surface. Bay bottom sediments at the main tower would be removed by dredging, holes would be drilled into bedrock, hollow steel pipe piles (8.2 feet [2.5 meters] in diameter) would be driven or socketed into the holes, and a pre-fabricated steel box (with concrete cover) pile cap would be floated into position and sunk onto the piles, sealed around them, and pumped dry. A large hammer at low energy would likely be used for socketing of the large piles. The piles would be filled with concrete and welded to the pile cap, which would be filled with reinforcing steel and concrete, and covered with a top slab. Precast concrete fenders would be brought to the site and attached to the pile cap. The slab would provide the surface on which four pre-fabricated steel tower legs would be erected. The legs would be raised by cranes and bolted together. Steel link beams would be bolted between the legs along their length. Temporary support piers will be placed in the Bay, one to the west and two to the east of the permanent main tower during its construction. Steel pipe piles, likely 24 to 36 inches (61 to 91centimeters) in diameter, would be used to support the temporary piers. Depending on methods selected by the contractor, cofferdams may be used

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[3] **Consultation project limits** were set taking into consideration the area where least terns and brown pelicans are known to be found around the Bay and the area signifying limits of potential project-related on-site and offsite mitigation measures.

during construction of the main tower foundation; however, it is unlikely due to water depths and the geology at this location.

All removed sediment would be placed on a barge for transport and disposed per Dredged Materials Management Office (DMMO) recommendations.

A temporary pile-supported dock for barges would be constructed near Clipper Cove on the north side of YBI for construction related activities such as delivery of materials. Piles for the dock would likely be 18, 24, or 36 inches (46, 61, or 91 centimeters) in diameter and fabricated of steel, concrete, or timber.

Pier E2 Construction

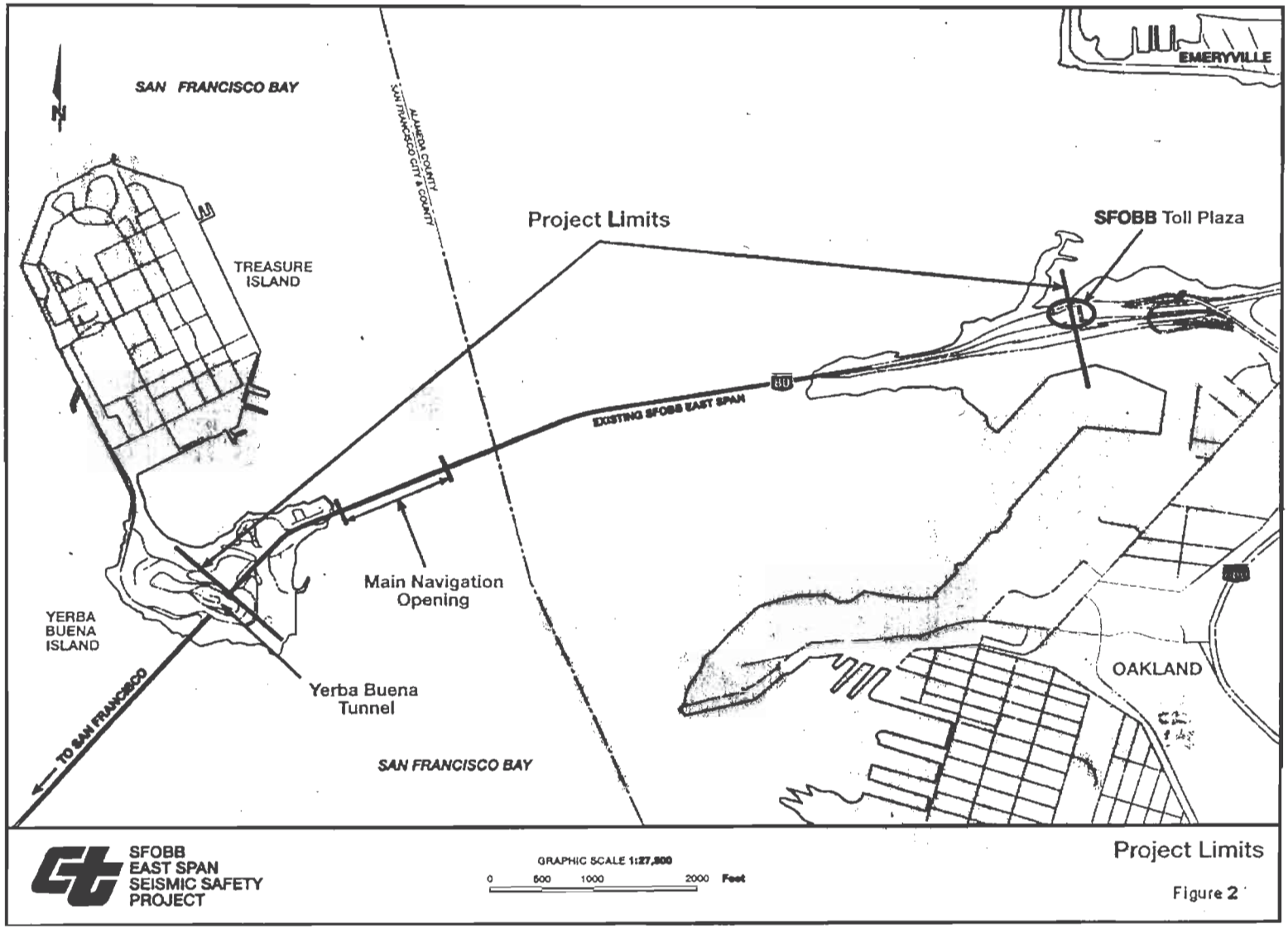
Hollow steel pipe piles would be driven into bearing strata and a pre-fabricated steel box (with concrete cover) pile cap would be floated into position and sunk onto the piles, sealed around them, and pumped dry. The piles would be filled halfway with concrete and welded to the pile cap, which would be filled with reinforcing steel and concrete, and covered with a top slab. All sediments within the piles resulting from pile driving would be removed, placed on a barge for transport, and disposed.

Skyway

The skyway would be a segmentally constructed prestressed, concrete box-girder. A temporary access trestle may be utilized to build portions of the skyway and allow for the delivery of materials, equipment, and work crews. It is expected that the trestle would be used in conjunction with the barges in areas of shallow water. The trestle for the skyway would be approximately 75,350 square feet (7,000 square meters). Barges may support the heavier equipment. Piles would support the trestle. Piles would likely be 18, 24, or 36 inches in diameter (46, 61, or 91 centimeters) and fabricated of steel, concrete, or timber. Temporary support piers will be placed in the Bay, at either end of the skyway, for support during its construction. Steel pipe piles, likely 24 to 36 inches (61 to 91 centimeters) in diameter, would be used to support the temporary piers.

Construction of the piles and the pile caps would be similar to construction of Pier E2. All sediments within the piles resulting from pile driving would be removed, placed on a barge for transport, and disposed. Depending on methods selected by the contractor, cofferdams may be used.

Near the Oakland approach, cofferdams may be used. The cofferdam would be placed, sediment excavated, and the cofferdam dewatered. The steel pipe piles would be driven, either before or after dewatering, to the Alameda formation. A steel box pile cap would be lowered onto the piles and welded to them. If necessary, the piles would be emptied of Bay sediments then the piles and pile caps would be filled with reinforced concrete.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Project Limits
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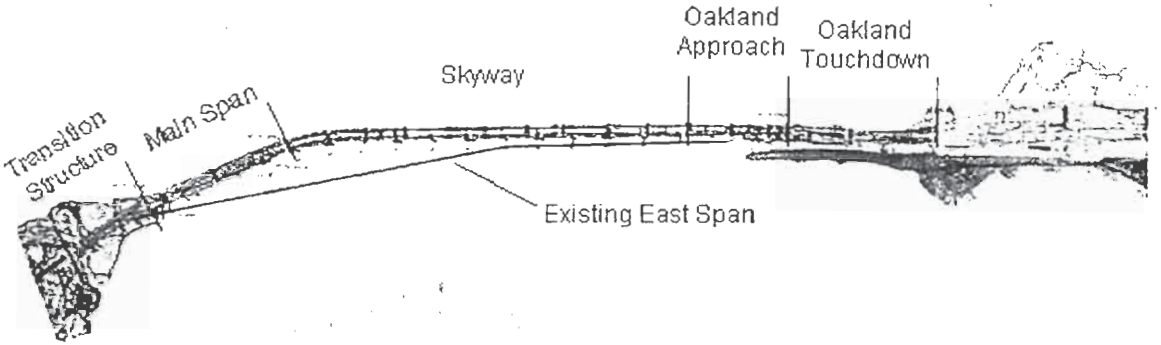
Project Limits
Figure 2



Skyway Section

- Located on an alignment north of the existing bridge
- Approximately 2.2 miles long, 2% slope
- Two side by side structures
- Bridge is composed of transition structure, main span, skyway, Oakland approach and Oakland touchdown
- Unified design from end to end
- Bicycle and pedestrian path located on south side of bridge

The pier forms would be placed, filled with reinforcing steel and concrete, then removed once the concrete is cured. The pier caps would be constructed similarly. Once the pier is complete, the cofferdams would be removed to at least 1.5 feet (0.46 meters) below the mudline.

Where the new structure is in close proximity to the existing East Span, the contractor would have to ensure the existing structure foundations remain stable. This may require placing a stabilizing system (such as sheet piling) in the Bay. When the pile cap construction is complete, the stabilizing system would be removed to at least 1.5 feet (0.46 meter) below the mudline.

Oakland Approach Structures

The Oakland approach structures would include a cast-in-place, prestressed, concrete box-girder supported by a cast-in-place, reinforced, concrete substructure. Falsework for the structures would be supported by temporary piles. A temporary access trestle would be utilized to facilitate construction and would be approximately 150,700 square feet (14,000 square meters). Piles would support the trestle. Piles would likely be 18, 24, or 36 inches (46, 61, or 91 centimeters) in diameter and fabricated of steel, concrete, or timber.

Construction in-Bay would include dredging for barge access, building a temporary access trestle, driving piles, and placing engineered fill in areas of shallow water near the Oakland Touchdown. At the Oakland Touchdown area, a portion of the new westbound roadway and the relocated maintenance road would encroach into the Bay, requiring use of engineered fill and surcharge in the Bay and upland areas. For construction of the westbound roadway, 1,970 linear feet of geotube[4] (approximately 0.5 acre) would be placed in the tidal area north of the Oakland Touchdown. Within the area protected by the geotube (approximately 2.63 acres), the existing soils would be excavated to an elevation of approximately -2.6 feet. Wick drains and vertical drains would be installed and evenly distributed throughout the excavated area to facilitate consolidation of underlying Bay mud and prevent liquefaction of overlaying sand. The drain would be covered with a layer of gravel upon which clean fill material would be placed. The weight of the surcharge material on the underlying Bay mud would force out the pore water in the substrate up through the wick drains. Runoff from the surface of the fill would drain to existing and temporary drainage features and would be subject to Storm Water Pollution Prevention requirements and standards. Best management practices that would be used include, but are not limited to, temporary slope drains, erosion control blankets, and fiber rolls. When the substrate has been drained and compacted by the weight of the surcharge material, a portion of the surcharge would be removed and the road surface would be constructed upon the remaining fill. The excess surcharge material would be removed to an upland site for reuse.

All sediments resulting from pile driving and dredging would be removed, placed on a barge for transport, and disposed.

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[4] The geotube is constructed of sand contained within a geotextile fabic.

Where the new structure is in close proximity to the existing East Span, the contractor would have to ensure the existing structure foundations remain stable. This may require placing a stabilizing system (such as sheet piling) in the Bay. When the pile cap construction is complete, the stabilizing system would be removed either fully or to at least 1.5 feet (0.46 meter) below the mudline.

Pile Driving

Current plans anticipate driving a total of 259 in-Bay large diameter steel pipe piles. Of these, 189 piles will be 8.2 feet (2.5 meters) in diameter and 70 piles will be 5.9 feet (1.8 meters) in diameter. These large piles will support the skyway and main span sections of the replacement bridge; they will be driven to depths ranging from about -256 feet to about -358 feet (-66 meters to about-108 meters), with most being driven to about –312 feet (-95 meters). The smaller diameter piles will support the Oakland Touchdown structures; they will be driven to tip elevations ranging from about -135 feet to about –213 feet (-41 meters to about -65 meters). In-Bay pile driving of these large diameter steel piles may require hammer energy levels up to 1,700 kJ.

The three large steel piles used in the Pile Installation Demonstration Project (PIDP) each required approximately five hours total driving time to reach the specified tip elevation. Based on this experience, it is expected that the 259 in-Bay piles could require about 1,300 hours of total pile driving time. However, the contractor will be allowed to drive simultaneously at multiple locations. Furthermore, it is possible that all three contractors (the contractor for the SAS-YBI portion, the contractor for the skyway, and the contractor for the Oakland approach structures) would drive piles simultaneously. Pile driving will be allowed only from 7:00 AM to 8:00 PM, seven days a week. Pile driving that is underway at 8 PM will continue until driving of that pile segment is complete.

Between approximately 2,060 and 1,030 smaller diameter (18-24 inches in diameter) temporary piles, fabricated of steel, concrete, or timber, would be driven into the bottom of the Bay to support trestles, falsework and pile driving templates (Table 1). Placement of these smaller piles is expected to require little hammer energy, probably on the order of less than 100 kJ. However, depending on the size of the pile, the equipment available at the time of construction, and the geology, up to 200 kJ may be required. This is an order of magnitude energy less than that necessary to drive the large diameter piles. Hammers of this size are commonly used for marine and near-shore construction around the Bay.

Table 1. Summary of Small Diameter Pile Quantities			
Location	**Maximum**	**Median**	**Minimum**
Skyway Trestle	600	400	300
Oakland Trestle	1200	800	600
YBI Dock	180	120	90
SAS Trestle	80	60	40
TOTAL	2,060	1,360	1,030

When they are no longer needed, temporary piles will be retrieved or cut off 1.5 feet (0.46 meters) below the mudline.

The depths of water from where in-Bay pile driving will occur range from 59 feet (18 meters) [piles for the self-anchored suspension span (SAS) tower] to 1 foot (0.3 meter) (footings located along the north shore of the Oakland Touchdown).

Dredging

Dredging would be required for barge access, foundation construction, and pile cap construction because near the Oakland shore the water depths are shallower than the draft of a standard barge. A barge access channel would be dredged on the north side of the replacement bridge in the vicinity of the Oakland Touchdown area. The anticipated maximum draft for the barges is 10 feet (3 meters), but to ensure adequate clearance over potential irregularities in channel depth, barge listing during heavy lifting, and to allow for some potential resettlement of materials in the channel after dredging, the channels would be dredged to a depth of 12 feet (3.6 meters) adjacent to the Oakland Touchdown and 14 feet (4.3 meters) for the rest of the channel.

Updated dredge volume estimates, areas to be dredged and material classifications are contained in letters from FHWA/Caltrans (June 19, 2001 and August 15, 2001) to the Dredged Material Management Office (DMMO) and from the Federal Highway Administration (June 12, 2001) to the National Marine Fisheries Service (NMFS).

Dredging Activities

Dredging and excavation are required to facilitate both construction of the new bridge and dismantling of the existing bridge. Details of dredging operations are contained in the documents and letters cited above. Overall, the proposed actions would:

Excavate within the shallow areas of the east shoreline of the Bay, i.e., less than 14 feet (4.3 meters) below mean sea level (MSL) in National Geodetic Vertical Datum (NGVD), to allow in-water access to the project area;

Excavate and remove materials necessary for installation of piers, footings, and foundations for the new bridge;

Excavate a barge access channel near the Oakland Touchdown for dismantling equipment; and

Excavate or remove existing East Span piers, footings, and foundations during dismantling.

Dredging techniques vary considerably in the types of equipment and methods employed Dredging techniques are expected to be either hydraulic or mechanical.

Hydraulic methods, using cutterheads, dustpans, hoppers, hydraulic pipelines, and plain suction equipment, involve the removal of loosely compacted materials through suction techniques. Loosely compacted materials that can be removed by hydraulic methods would typically be fine-grained sediments that have not yet naturally settled, or have been loosened and entrained in the water column by mechanical or hydraulic means. Hydraulic dredging typically minimizes disturbance and resuspension of sediments, but involves entrainment of high volumes of water.

Mechanical dredging typically involves the removal of more compact materials by equipment such as clamshell (open and closed bucket), dipper, or ladder dredges. These techniques involve removing sediments by dislodging and excavating the material, and then raising it to the surface and discharging it into a barge or scow.

Description of Soil Materials

The major geologic formations which underlie Bay waters in the project area include Young Bay Mud, Merritt Sands, Yerba Buena Mud (Old Bay Mud), the upper and lower Alameda Formations, and Franciscan Bedrock. The depth of the Young Bay Mud ranges from 6 to 50 feet (1.8 to 15 meters) along the project alignment. These Young Bay Muds consist primarily of clay, with some silt, sand, and shell fragments. Merritt Sands underlie the Young Bay Mud along much of the alignment.

Sediments encountered during dredging of the construction access and dismantling access channels are expected to consist entirely of Young Bay Muds. Sediment removal during pier construction is expected to encounter all sediment types. Some bedrock would also be removed during pier construction.

Only finer grained materials (mud and sand) would be suitable for aquatic disposal. rock, coarse gravel, or materials such as concrete, steel and other construction debris would not be suitable for aquatic disposal and would be taken to the appropriate upland locations for disposal or recycling.

Sediment sampling and analysis have been conducted since the Dredged Materials Management Plan (DMMP) was circulated. The results of this analysis have been reviewed by the DMMO. In

its letter of October 31, 2000 (in Appendix G of the FEIS), the DMMO indicated the volumes of dredged materials that would be "Suitable for Unconfined Aquatic Disposal" (SUAD) and "Not Suitable for Unconfined Aquatic Disposal" (NUAD). The vast majority of material from the project alignment has been found to be SUAD.

Dredging Quantities

The initial construction of the barge access channel, on the north side of the existing structure, will generate 216,230 cubic yards (165,320 cubic meters) of dredged material to be disposed at the San Francisco-Deep Ocean Disposal Site (SF-DODS). Dredging of the access channel is expected to take four to six months.

Construction of the East Span piers and footings would result in the dredging and disposal of up to 187,087 cubic yards (143,038 cubic meters) of material. This material would be dredged in small quantities over four years as each pier is constructed. Because of the small monthly volumes to be generated over the four-year period, FHWA/Caltrans plans to dispose of this material at the Alcatraz disposal site (SF-11). All material dredged from within the piles would be disposed at SF-11 with the exception of the upper 12 feet (3.66 meters) of Piers E1–E6 and E15–E18, as recommended by the DMMO; this material would be disposed of at appropriate upland facilities.

Once the construction of the East Span is completed and put into service the dismantling of the existing bridge structure would begin and would require an access channel constructed just south of the existing structure. This would generate up to 190,680 cubic yards (145,785 cubic meters) of dredged material. This material is classified as SUAD (June 19, 2001 letter from FHWA/Caltrans to the DMMO).

Dredged materials generated for construction of the dismantling access channel would be beneficially reused at the Hamilton wetlands restoration site, assuming the site is operational, can accept the materials, and reuse is practicable. If the above conditions are not met, the material would be disposed at SF-DODS. Dredged material generated by removal of the existing East Span piers is proposed for disposal at the SF-11 site. Additional sampling will be undertaken and a supplemental Sampling and Analysis Plan (SAP) will be submitted to the DMMO prior to this dredging operation (see Caltrans letter dated June 19, 2001).

Mr. Michael G. Ritchie

Current project dredging volume estimates are depicted in Table 2

Table 2. Summary of Dredging Quantities					
Activity	Dredging for Barge Access Channel to Construct New Bridge	Dredging to Construct New Piers and Footings	Dredging for Barge Access Channel to Dismantle Existing Bridge	Dredging to Remove Existing Bridge Piers	Total Dredged Volume
Volume	216,230 yards^3 (165,320 meters^3)	187,087 yards^3 (143,038 meters^3)	190,680 yards^3 (145,785 meters^3)	22,724 yards^3 (17,374 meters^3)	616,721 yards^3 (471,517 meters^3)

Disposal Areas

Expanded information about these sites is located in the project DMMP and in the August 1993 FEIS for Designation of a Deep Water Ocean Dredge Material Disposal Site off San Francisco, California.

Deep Ocean Disposal (SF-DODS). The SF-DODS is located on the continental shelf, approximately 50 nautical miles (91 kilometers) west of the Golden Gate, at a depth of approximately 760 feet (230 meters). This site is approximately 55 nautical miles (102 kilometers) from the proposed dredging location. This site was designated in 1994 under Section 102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA). It can accept up to 4.8 million cubic yards (3.7 million cubic meters) per year, and has the capacity to accept all SUAD material from the proposed dredging activities for the East Span Project assuming physical criteria such as sediment grain size are met. Disposal at this site would significantly reduce impacts to listed species found within San Francisco Bay.

Alcatraz (SF-11). The SF-11 site is the closest disposal site to the East Span Project area, four to six miles (6.5 to 10 kilometers) away. The site can accept a total of 400,000 cubic yards (305,810 cubic meters) per month between October and April and 300,000 cubic yards (299,357 cubic meters) per month between May and September. This site has the physical capacity to accept most of the material generated on the East Span Project, depending upon the exact timing of dredging.

Hamilton Wetlands Restoration. The former Hamilton Army Airfield is located near the City of Novato in Marin County, approximately 18 miles (29 kilometers) from the East Span Project. The site was historically within the tidal zone of San Pablo Bay. In the 1930s, portions of the area were diked and used as a military base and airfield until the 1970s when the base was closed. The site is currently being prepared for transfer and reuse under the Base Realignment and Closure Act of 1988. A wetlands restoration project has been proposed to restore a mix of seasonal and tidal wetlands on up to 900 acres (360 hectares) of land, which

were previously used as the airstrip for the base and an adjacent antenna field to the north (State Lands Commission parcel). The site is not yet ready to accept dredged material and consultation under section 7 of the Act has not yet been completed.

Dismantling of the Existing Bridge

Dismantling activities would consist of seven major stages, which represent major components of the existing bridge and construction-related structures, including:

- YBI viaduct;
- YBI 288-foot (88-meter) steel truss approach spans;
- Oakland approach structures;
- YBI temporary detours;
- Cantilever truss spans;
- 504-foot (154-meter) steel truss spans; and
- 288-foot (88-meter) steel truss spans.

The YBI viaduct, the YBI steel truss approach spans, the Oakland approach structures, and the YBI temporary detours would be dismantled during construction of the replacement bridge because of construction staging. The temporary detours could be removed as soon as they are no longer needed to carry traffic or as one of the last steps of bridge construction, depending on whether the contractor chooses to use them as platforms from which to construct other portions of the bridge. The three remaining sections would be dismantled under separate contracts.

Dredging

Some areas near the Oakland Touchdown are too shallow to accommodate barges to dismantle the existing bridge; thus, a barge access channel would need to be dredged. The suitability of sediments in the barge access channel for dismantling the existing bridge would be evaluated prior to disposal per DMMO's recommendation.

After dismantling the superstructure, the bridge foundations would be removed to an elevation of at least 1.5 feet (0.46 meter) below the mudline. This would require the removal of sediments around the footings through the use of cofferdams. Techniques such as reverse circulation drilling, jetting, and air lifting may be used by the contractors to remove the material around the footings. These methods would involve creating a slurry of material within the cofferdam and lifting or pumping it into the drilling vessel or barge. The concrete from the dismantled footings would be removed and transported by barge or truck to a predetermined site for reuse, recycling, or disposal. Existing piles would be cut off to an elevation at least 1.5 feet (0.46 meter) below the mudline. Once the cofferdams are removed, natural sedimentation would fill the area surrounding the cut-off-piles.

Dismantling of the Superstructure

Removal of decks could be performed by cutting them into pieces or by disassembling them panel-by-panel. Truss spans near the Oakland shore may be removed by conventional barge and crane methods due to the shallow water and low clearance under the deck. Options include constructing temporary supports under the span and disassembling the truss segment by segment, dredging for barge clearance, constructing temporary embankments of engineered fill within the Bay for access, or using special shallow-draft barges or rigging devices for lowering sections onto barges from the bridge deck. Protective measures would be taken to prevent materials or debris from falling into the Bay. Depending on location, materials could be removed by barge or truck to a predetermined site for reuse, recycling, or disposal.

Dismantling of the Substructure

Substructure elements could be lifted from their bases in one piece or piece-by-piece. Dismantling of concrete foundations would require reducing the reinforced concrete to pieces small enough to be hauled away, which could be done by mechanical means such as saw cutting, flame cutting, mechanical splitting, or pulverizing and hydro-cutting. The hollow interiors of the piles remaining below the mudline could also be used as receptacles for pieces of concrete as the pier above is dismantled. This method would substantially reduce the quantity of material requiring transport and disposal and would lower dismantling costs. The piles remaining below the mudline could be capped or would gradually fill in through siltation. Any reinforcing steel would be cut off to be flush with the face of the concrete that remains below the mudline.

Removal of the piles to 1.5 feet (0.46 meter) below the mudline could be completed by an underwater dismantling method or by constructing cofferdams at each pier. The use of cofferdams at YBI would depend on methods selected by the contractor, however their use is assumed for purposes of estimating dredged quantities generated by existing bridge removal.

Proposed Impact Avoidance, Minimization, and Compensatory Measures

FHWA/Caltrans has proposed a variety of **biological conservation measures** to offset potential impacts to listed species and biological resources as a result of the proposed project. Project impacts would occur as a result of barotraumatic exposure caused by piles driving operations, impacts as a result of dredge and disposal operations, and possible increases in predation as a result of project-related equipment.

Barotrauma Mitigation

The pathologies associated with exposure to drastic changes in pressure, like that experienced when high-level underwater sound is produced from large-scale underwater pile driving operations, are collectively known as barotraumas.

Bubble Curtain

A bubble curtain system, or other marine pile driving energy attenuator approved by the Service and the National Marine Fisheries Service (NMFS)[5], has been incorporated into the East Span Project to **minimize** impacts. Operation of a bubble curtain will be required for driving of all large diameter permanent in-water piles. A continuous stream of air bubbles will enclose all permanent in-water piles/pile groups during the pile driving process[6]. Pile driving will be allowed only from 7:00 AM to 8:00 PM, seven days a week. Pile driving underway at 8 PM may continue until driving of that segment is complete.

Contractor specifications will stipulate the positioning, configuration, operation and removal of the bubble curtain system. The bubble curtain system will consist of air compressors, air supply lines, distribution manifolds, and aeration pipelines.

The aeration pipe will be perforated pipe configured into concentric rings spaced no more than five (5) vertical meters apart at all tide conditions. The lowest aeration pipeline layer will be designed to ensure contact with the mud line without sinking into Bay mud.

The bubble curtain system will be constructed on a frame designed to keep the aeration pipelines stable (horizontal) and to provide enough ballast to counteract any inherent buoyancy of the system during operation. When emplaced, the bubble curtain system must be configured such that the aeration pipelines completely enclose the pile/pile group at a minimum distance of two (2) meters.

Each aeration pipeline will have four adjacent rows of approximately 1.6 mm diameter air holes spaced approximately 20 mm apart.

Airflow to the bubble curtain system will be sufficient to provide a minimum bubble flux of three cubic meters per minute, per linear meter of pipeline in each concentric ring (16 cubic feet per minute, per linear foot).

Valves and gauges to measure air pressure and flow rates will be installed in the main air supply lines and at critical branch locations and shall be accurate to +/- 2%. All gauges shall be installed to be accessible to FHWA/Caltrans inspectors. The contractor will keep a log and graphic plot of all gauge readings, with data logged during every 30 minutes of operation. If the reading of any gauge drops below 10% of normal operation, pile driving will stop until the defect is repaired to the satisfaction of the FHWA/Caltrans' Engineer.

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[5] Associated with NMFS formal consultation for the East Span Project

[6] Unless other equally effective methods such as cofferdams are used, or as otherwise directed by FHWA/Caltrans for the purpose of collecting performance data.

The contractor must submit a bubble curtain system design and supporting calculations for FHWA/Caltrans' review within two (2) months of receiving notice to proceed on the project FHWA/Caltrans will comment on the system within one (1) month and the contractor shall respond within two (2) weeks of FHWA/Caltrans comments.

The contractor will be required to demonstrate the operation of the bubble curtain system during the re-strike of the Pile Installation Demonstration Project piles. The contractor will ensure that bubble "drift" at maximum tidal flux or current does not compromise the integrity of the continuous bubble curtain.

The pile-driving barge will also be isolated so that noise from the pile installation is not transmitted through the barge into the water-column.

Habitat-related Mitigation

Caltrans conducted an extensive review of potential mitigation sites in the central San Francisco Bay to identify areas suitable for creating and/or restoring eelgrass (*Zostera marina*) beds, intertidal sand flats, mudflats and tidal marsh. Most of the sites were not feasible because they were either too small or were not available for mitigation purposes. Only one site within the Central Bay, the Breuner property, was large enough to meet the mitigation requirements of the project. However, several significant constraints precluded Caltrans from utilizing the site.

Potential mitigation sites immediately adjacent to the project area and the Emeryville Crescent were rejected because the sites were too small or not available for the required mitigation. These sites included: *Radio Point* - located immediately north of the Bay Bridge Toll Plaza, *West Grand Avenue* - located north of the new West Grand Avenue overpass just east of the Bay Bridge Toll Plaza, and *Oakland Touchdown* – located at the existing Bay Bridge touches land in Oakland.

Several potential sites north of the project area within the Eastshore State Park were also investigated; however, the park planning process, which will include extensive public participation, may not be completed until 2002. This timeline is not in accordance with the plans for the East Span Project; therefore these sites were eliminated from consideration as potential mitigation sites. These sites included: *Brickyard Cove* - located south of University Avenue, and west of the frontage road on the west side of Interstate 80 in the City of Berkeley, *Berkeley Meadows/Virginia Street* - located north of University Avenue and west of the frontage road on the west side of Interstate 80 in the City of Berkeley. In addition, the *City of Albany's former landfills at Buchanan Marsh and Albany Bulb and Beach* - were considered; however, these sites are too small to meet FHWA/Caltrans' mitigation needs. Moreover, the City of Albany has received funds from the State of California to restore Albany Bulb and Albany Beach, precluding the use of these sites by FHWA/Caltrans for mitigation purposes.

Two potential mitigation sites were identified in the City of Richmond: the *Liquid Gold property* and the *Breuner* property. The Liquid Gold/Hoffman site is too small to meet FHWA/Caltrans' mitigation needs. The Breuner site is sufficiently large and was initially identified by Caltrans as a preferred mitigation site. Caltrans developed conceptual mitigation scenarios for the site. However, several significant constraints precluded Caltrans from utilizing the site for mitigation, including property access, hazardous materials testing, potential long-term Section 7 Endangered Species Consultation, sole source contracts, acquisition of property interest, and public access. Additional information on these issues is presented in FHWA/Caltrans' Department of the Army Section 404 permit application.

To compensate for the project's impacts, FHWA/Caltrans plans to implement measures that would restore and enhance habitat values affected by project construction activities in the following manner.

Special Aquatic Sites

Eelgrass. To mitigate temporary impacts to eelgrass beds, FHWA/Caltrans would implement a turbidity control program. The program would include measuring turbidity and light attenuation at the project boundary to compare with ambient conditions within the eelgrass beds. These measures would be used to monitor additional sediment transport caused by dredging and other construction activities within the project boundaries. Contract specifications require that depth-averaged turbidity measured at established locations along the project boundary in eelgrass beds shall not exceed 10% percent above ambient levels in any period of monitoring, day or night. Light transmittance may not be reduced by 10% percent or greater for an accumulated period longer than 8 hours in a given week during the months of January, February, March, October, November, December and 16 hours in a given week during the months of April, May, June, July, August, and September. If measured turbidity or light attenuation exceed the established limits, as determined by monitoring, appropriate control measures shall be implemented by the Contractor or the construction activity would be suspended to reduce turbidity and light attenuation to within the described limits.

To offset the placement of permanent and temporary fill in San Francisco Bay and impacts to eelgrass beds, FHWA/Caltrans proposes on-site restoration of eelgrass beds. In addition, FHWA/Caltrans proposes offsite, out-of-kind mitigation measures to at least compensate any lost habitat values.

On-site Mitigation. FHWA/Caltrans evaluated options for in-kind replacement of permanently impacted eelgrass beds at or near the project site. Initially, FHWA/Caltrans proposed to create new eelgrass beds at the Oakland Touchdown area and at Clipper Cove on YBI by placing sand-filled plateaus to raise the elevations of the Bay bottom to a level suitable to support eelgrass growth and then planting the areas with eelgrass from a donor site. However, BCDC opposed creating new habitat in the Bay using fill material.

Creation of eelgrass habitat is still experimental in the Bay, and the success rate for such projects varies depending on what method is used (Merkel & Associates 1998). The Richmond Harbor Training Jetty Eelgrass Transplant Program, which was completed in 1985, was among the first transplant programs in the Bay Area. Eelgrass was transplanted to a site that was not manipulated. The survival of the plants was mixed, depending on the location and age of the donor material. The eelgrass in the control and transplant areas did not expand their range in the spring and summer of the transplant year. Based on the experience of this project, Merkel concluded that in the Bay sites specifically manipulated for eelgrass transplantation may be more successful (Merkel & Associates 1998 and Fredette et. al. 1988). Although much research on eelgrass restoration has occurred in southern California, the habitat in the San Francisco Bay is sufficiently different that available data from southern California is not readily transferable.

Despite these challenges, Caltrans proposes on-site restoration of eelgrass habitat. This approach is distinct from creating new eelgrass habitat in that it focuses on restoring areas that are historically known to have supported eelgrass habitat. The proposed restoration would maximize the potential for planting success by incorporating site manipulation, monitoring and data collection.

FHWA/Caltrans' proposed on-site mitigation includes:

- Harvesting approximately 0.55 acres (0.22 hectares) of eelgrass from the footprint of the barge access channel prior to dredging, planting test plots in adjacent eelgrass beds and monitoring to evaluate performance;

- Restoring to its pre-construction bathymetry up to approximately 1.73 acres (0.70 hectares) of the barge access channel. Stockpiled dredged material and excavated sand would be used to facilitate eelgrass colonization and the area would be replanted with eelgrass from an adjacent donor site [Note: this aspect of Caltrans' proposal cannot be implemented without a change in BDCD policy]. FHWA/Caltrans will monitor replanted eelgrass to evaluate its performance.

Construction controls and Environmentally Sensitive Areas with fencing, buoys or similar devices would be included in the project plans, specifications, and estimates to avoid impacts as much as possible. FHWA/Caltrans would monitor for turbidity due to dredging, pile driving, barge maneuvering, and mud boils. A turbidity control program, which may possibly include limitations on barge and tug boat maneuvering would be required. Post-construction surveys to evaluate impacts of turbidity on eelgrass would also be implemented. If additional eelgrass beds have been affected during construction, FHWA/Caltrans would consult with the permitting agencies to determine if additional mitigation is warranted.

Intertidal Sand Flats. To minimize impacts to intertidal sand flats at the Oakland Touchdown area, FHWA/Caltrans would place geotextile fabric and plywood onto the intertidal sand flats before placing a geotube. The geotube would act as a tidal berm rather than using engineered fill and would reduce the potential for mud boils. That portion of the intertidal sand flats affected by the temporary placement of a geotube and mud boils would be restored to pre-existing conditions following construction as described in the East Span Project EIS.

In addition to offsite mitigation explained below, FHWA/Caltrans' proposes on-site mitigation including:

- Restoration of approximately 1.70 acres (0.69 hectares) of intertidal sand flats that are temporarily affected by the placement of a geotube or mud boils from engineered fill;

- Implementation of measures on-site to replace and/or restore shorebird roosting habitat and cormorant habitat;

- Construction of rock slope protection to allow sand to accrete over the rock areas subject to tidal action. Slope gradients would be 1(V):3(H) at the toe of the slope and transition to a 1(V):2(H) gradient at mid-slope, and

- The capping of rock slope protection areas with soil above the limits of tidal action to provide a medium to support growth of native upland plants and provide more natural upland transition than the existing abrupt slope.

Offsite Mitigation. In addition to on-site mitigation, FHWA/Caltrans shall provide $10,500,000 to fund mitigation at offsite locations to restore, enhance, or create new aquatic habitat and transitional uplands within the San Francisco Bay area. FHWA/Caltrans would continue consultation with State and Federal resource and regulatory agencies on the parameters of the restoration fund and mitigation opportunities. The relevant agencies would include: San Francisco Bay Conservation and Development Commission, Regional Water Quality Control Board, California Department of Fish and Game, US Army Corps of Engineers, US Environmental Protection Agency, US Fish and Wildlife Service, and National Marine Fisheries Service. FHWA/Caltrans proposes to provide mitigation for the project's direct impacts using the $10,500,000 at offsite locations. Potential locations include the following:

- FHWA/Caltrans proposes to provide funding to the East Bay Regional Park District (EBRPD) to restore, enhance or create new aquatic habitat and transitional uplands at the Eastshore State Park and within Central San Francisco Bay. Potential mitigation sites include:

a. Radio Beach Area-potential shoreline restoration including intertidal habitat and upland transition zones;
b. Brickyard Cove Area-potential shoreline restoration including intertidal habitat, the removal of riprap and upland transition zones;
c. Albany Beach Area-potential beach restoration/nourishment including the removal of parking areas; and,
d. Hoffman Marsh Area-potential tidal marsh restoration including the removal of fill and improving tidal action and water circulation.

Caltrans proposes to provide funding to the Service to acquire, cleanup contaminants, and initiate restoration of approximately 3,298 acres of diked historic baylands at Skaggs Island, Sonoma County. This effort will focus on maximizing benefits to the ecosystem in of the San Pablo Bay.

FHWA/Caltrans proposes that any restoration funds provided to the Service for offsite mitigation purposes be disbursed using the following parameters:

the Service must be fully responsible for designing, constructing, monitoring and managing the habitat creation and/or restoration;

the Service must be responsible for obtaining all necessary local, State and Federal permits and completing any required environmental compliance including endangered species consultation;

The habitat creation and/or restoration must be consistent with the recommendations of the Baylands Ecosystem Habitat Goals and should include eelgrass and intertidal sand flat habitat to the extent practicable;

The habitat creation and/or restoration should be planned and designed to be self-sustaining over time to the extent possible;

The acquisition and restoration funds should be used for replacing the functions and values of aquatic habitat and not to finance non-mitigation programs (e.g., education projects or research); and

The area encompassed by the habitat creation and/or restoration should be protected in perpetuity with appropriate real estate arrangements (e.g., conservation easements, transfer of title to Federal or State resource agency or non-profit conservation agency).

Timing of Mitigation

The first phase of mitigation, which involves harvesting and transplanting eelgrass, would occur prior to dredging for the Oakland Approach Structures Contract. The remaining

on-site eelgrass mitigation cannot be fully implemented until project completion, which would take approximately seven years. Intertidal sand flat mitigation could begin once the Geofill Contract has been completed and the rock slope protection installed at the Oakland Touchdown. Establishment of the acquisition and restoration fund could be implemented prior to construction of the Skyway Contract. Implementation of off-site restoration activities depends on several factors, including Federal or State agencies obtaining site control, preparation of appropriate plans, conducting environmental review, and obtaining necessary regulatory permits.

Species-specific Mitigation

American Peregrine Falcon. FHWA/Caltrans and the Service developed mitigation approaches to avoid impacts to the American peregrine falcon. Mitigation includes continuation of the monitoring and release efforts by Santa Cruz Predatory Bird Research Group. If construction activities disturb nesting activities, the monitors would collect the eggs and/or capture and release any chicks present to a natural off-site location. These measures would apply even though the falcon has been delisted because this species is protected under the Migratory Bird Treaty Act and the California Endangered Species Act.

Double-crested Cormorant and Western Gull. FHWA/Caltrans would monitor the double-crested cormorant colony during breeding season and prevent the birds from nesting on the existing bridge where potential impacts by construction activities could occur. The protocol to prevent double-crested cormorants from nesting would follow the methods implemented for maintenance activities on the existing bridge. This protocol involves washing partially constructed nests off the bridge with water when the nests are not actively occupied. If the nests are completed and the birds have laid eggs, the nests would not be disturbed. Similar measures would be used to prevent western gulls from nesting. Cormorant nesting platforms will be installed on the new east spans, and it is expected that the cormorants will colonize this replacement habitat..

Black-crowned Night Heron, Allen's Hummingbird, White-tailed Kite, Bank Swallow, and Bewick's Wren. Prior to the removal of vegetation and trees during construction of any build alternative on YBI, a biological monitor would survey for nests. Any vegetation or trees with nests or those adjacent to areas with nests would not be removed until the nesting period is complete. Alternatively, to the extent feasible, vegetation and trees that need to be removed could be removed prior to the nesting season (after surveys have been conducted), so as to not affect the construction schedule. Nesting for these species usually occurs between January and July.

Shorebirds. Mitigation for the temporary loss of shorebird roosting habitat as a result of any build alternative would include enhancement or creation of upland refugia as part of the creation of the tidal marsh ecosystem mentioned above. On-site shorebird roosting habitat will also be constructed.

California Least Tern. If, through monitoring, it is determined project construction activities result in a taking of the least tern, actions will be taken, as a result of negotiations with the Service and other agencies, to provide additional predator and vegetation controls at the least tern nesting colony at the Naval Air Station (NAS) at Alameda. Additionally, in alignment with the *California Least Tern Recovery Plan* (USFWS, 1977), FHWA/Caltrans will participate in processes to establish additional California least tern nesting areas at appropriate locations around the Bay to help stabilize and increase the least tern population.

California Brown Pelican. If, through monitoring, it is determined project construction activities result in a taking of the brown pelican, FHWA/Caltrans will work with the Service to evaluate methods to remove further project-related impacts to the species.

Harbor Seal, California Sea Lion, and Gray Whale. Prior to commencement of any pile driving, a preliminary 500-meter (1,640-foot) radius safety zone for pinnipeds (harbor seals and California sea lions) will be established around the pile driving site. The safety zone is intended to include all areas where the underwater sound pressure levels are anticipated to equal or exceed 190 dB re 1 µPa RMS (impulse). Once pile driving begins, sound pressure levels will be recorded at the 500-meter (1,640-foot) contour. The safety zone radius for pinnipeds will then be enlarged or reduced, depending on the actual recorded sound pressure levels. A 180-dB re 1 µPa RMS (impulse) safety zone for gray whales will be established for pile driving occurring during the gray whale migration season from December through May.

Observers on boats will survey the safety zone to ensure that no marine mammals are seen within the zone before pile driving of a pile segment begins. If marine mammals are found within the safety zone, pile driving of the segment will be delayed until they move out of the area. If a marine mammal is seen above water and then dives below, the contractor will wait 15 minutes and if no marine mammals are observed in that time it will be assumed that the animal has moved beyond the safety zone

Winter-run, Fall-run, and Spring-run Chinook Salmon, Steelhead, Green Sturgeon, and Longfin Smelt. FHWA/Caltrans would implement a turbidity control program to avoid and minimize impacts to critical habitat for chinook salmon and other fish. A bubble curtain system has been incorporated into the project to avoid and minimize impacts from peak underwater sound pressure levels to listed species. The bubble curtain will be operated during driving of all large diameter (2.5 meter and 1.8 meter) permanent in-water piles, unless other equally effective methods such as cofferdams are used, or as otherwise directed for the purpose of gathering baseline sound pressure level data or other bubble curtain performance data. The bubble curtain system will produce a continuous stream of bubbles that will be required by contractor specification to enclose each pile or pile group during the pile driving process, including at maximum tidal flux and current.

Pacific Herring. Construction activities that occur during the peak herring spawning season, generally January to March, would be monitored by a qualified biologist to watch for the presence of spawning herring. If the biologist (or CDFG) observes spawning in the project area, in-water construction activities such as pile driving and dredging would be suspended within 200 meters (660 feet) of observed spawn. In-water construction activities would not resume at that location for a period of up to 14 days (as determined by a qualified biologist), allowing herring eggs to hatch and larvae to disperse. In addition, the use of a turbidity control program would reduce the impacts of turbidity on the herring spawn. The bubble curtain system, described above, will also avoid and minimize peak underwater sound pressure level impacts to Pacific herring.

Storm Water Run-off Mitigation

FHWA/Caltrans proposes to permanently capture and treat storm water runoff from a portion of the new bridge, the metering lights and toll plaza area, and east to the Powell Street interchange in Emeryville. An area totaling approximately 155 acres is proposed for capture and treatment. This treatment would improve the quality of water draining into the Emeryville Crescent and Central San Francisco Bay, and thus would enhance wildlife habitat. In addition, the replacement bridge will benefit water quality by removal of the existing bridge, a source of lead-based point.

Biological Monitoring

A monitor will be placed to observe construction areas where project-related pile driving and dredging activities are underway in an effort to avoid and minimize impacts to federally listed species, including:

Pile Driving Impacts

Project-related pile driving impacts will be monitored as follows:

- An observer, approved by the Service, will be placed to monitor the driving of the 259 in-Bay large diameter steel pipe piles. These pile driving operations will be monitored continuously for associated impacts to least terns or brown pelicans from April 1st to October 1st each year of project-related pile driving operations. Any impacts to least terns and brown pelicans will be reported to the Service immediately and a report provided annually.

- FHWA/Caltrans will coordinate with other ongoing efforts to monitor least tern nestling survival at the colony at NAS Alameda. Utilization of existing data collection efforts will be maximized.

Habitat-related Impacts

Project-related habitat mitigation activities, including compliance with any performance criteria, will be monitored either directly by FHWA/Caltrans or by a third party that assumes that responsibility. Success in achieving mitigation for project-related impacts will be reported to the Service.

Project Reporting Commitments

FHWA/Caltrans, or a third party accepting the responsibility, will submit to the Service the following documents, reports, or plans prior to beginning on-site construction activities, or prior to implementation of activities to adequately mitigate the project's impacts. Because of project phasing, some plans may be submitted separately, over time, prior to the beginning of construction for the project's different contracts.

- On-site Mitigation Plan;
- Off-site Mitigation Proposal;
- Final Implementation Plan and Schedule;
- Mitigation-related Project Plans; and
- Restoration Fund Allocation and Reporting Plan

If requested, FHWA/Caltrans will provide copies of the following to the Service that are required for the project-related RWQCB permit process:

- Dredging Operations Plan
- Storm Water Management Plan
- Storm Water Pollution Prevention Plan
- Construction Phasing Schedule

Not later than one year following the bid opening for the Skyway work, FHWA/Caltrans will submit to the Service a plan that addresses the proposed on-site wetland mitigation elements. The plan shall include all appropriate detail for earthwork and plantings, as well as an implementation schedule, performance standards, and monitoring.

Not later than 60 days prior to the beginning of in-water construction activities, FHWA/Caltrans shall submit to, and/or work with the Service to complete, a final implementation plan describing the additional mitigation activities. The implementation plan shall include detailed descriptions of the proposed activities, including appropriate project plans, an implementation schedule, and reporting. The plan or subsequent report shall demonstrate that Caltrans has fully funded $10.5 million or has $10.5 million in funds available for offsite restoration activities. This plan or report will be completed by a third party by no later than 60 days prior to the beginning of construction.

The biological conservation measures as proposed above and in the project materials reviewed by the Service are considered part of the proposed actions evaluated by the Service in this Biological Opinion. Any change in these plans or their implementation

that might adversely affect listed species, either directly or indirectly, requires reinitiation of consultation with the Service, as set forth in the final paragraphs of this letter.

SPECIES ACCOUNTS/ENVIRONMENTAL BASELINE

Species Accounts

California Least Tern

The least tern was federally protected as endangered on October 13, 1970 (35 **FR** 16047). A detailed account of the taxonomy, ecology, and biology of the least tern is presented in the approved Recovery Plan for this species (Service 1980). Supplemental or updated information is provided in the Service's July 16, 1993, Biological Opinion on the Federal Aviation Administration's authorization for proposed facilities improvements at San Diego International Airport, California, which is hereby incorporated by reference.

Least terns typically arrive at NAS Alameda in mid to late April, but have arrived as early as April 6, and depart in mid to late August each year. During this time period, least tern adults mate and select nest sites; lay, incubate, and hatch eggs; and raise young to fledglings prior to migrating south for the rest of the year. Hatchlings are typically fed from June through mid-August. Since 1977, the majority of nesting activities have occurred in the 4-acre, fenced "traditional" colony site on the western end of NAS Alameda, but prior to 1987, least tern nesting also occurred in other areas within the proposed Refuge outside the traditional site area (L. Collins *in* Symposium Proceedings). Furthermore, least terns have moved their young to various locations within the buffer zone surrounding the main colony site during several breeding seasons (and on one occasion as far as about 4,000 feet northwest of the main colony site), apparently to avoid predator pressure at the main colony site. While at NAS Alameda during the breeding season, least terns forage for fish in the open water offshore of the western end of NAS Alameda, which contains extensive, generally productive foraging habitat areas. Foraging intensity has varied between different offshore areas, but has occurred in the Oakland Harbor, Seaplane Lagoon at NAS Alameda, and areas southeast, south, and west of the traditional least tern colony site. During the breeding season, least terns are central-place foragers, that is, they return regularly to a central place--the nest--from their foraging trips. Most foraging activity occurs within 2 miles of the nesting site (Atwood, 1983). Having foraging places near their nests is beneficial to the terns because it reduces the energy cost of flying to the feeding site and reduces the time needed to bring a load of fish back to the nest.

According to the 1995 Caffrey report, the least tern breeding site at NAS Alameda has played a significant role in recent increases in the number of least terns throughout California. The NAS Alameda site is consistently one of the most successful sites in California. Between 1987 and 1994, the NAS Alameda site supported 5 to 6 percent of

the statewide breeding population out of 35 to 40 sites each year, but produced an average of 10.6 percent of the total number of fledglings produced statewide in each of those years. In 1997, an estimated 244 pairs of least terns nested at the colony out of a total population of more than 4,000 nesting pairs at 37 breeding sites along the California and Baja California coasts. In 1997, an estimated 316 young fledged successfully at NAS Alameda; this represented 10.1 percent of the total number of fledglings produced throughout California that year. By consistently producing large numbers of fledglings each year, the colony has added large numbers of potential new breeding birds to the statewide population. Therefore, this site is considered to be one of the most important "source" populations in California serving to balance out losses at many "sink" locations throughout the State. Because of its importance for least terns, the Service plans to establish a National Wildlife Refuge (Refuge) on lands at NAS Alameda that will include the traditional 4-acre least tern colony site and surrounding buffer areas.

There are two other minor least tern breeding sites in the San Francisco Bay area, the Oakland Airport and PG&E Pittsburg power plant site. The Oakland Airport site has not been used in years and the Pacific Gas and Electric Pittsburg site supports only one to four pairs each year. Therefore, the NAS Alameda site currently represents the entire San Francisco Bay area population, and is the most northern of least tern breeding colonies by about 178 miles. Because of its northern location, the NAS Alameda site is relatively unaffected during El Niño years when many southern California sites experience pronounced breeding failure resulting from limited food availability. In the most recent previous El Niño year, 1992, the NAS Alameda site supported 6 percent of the statewide number of breeding pairs, but produced 16 percent of the total statewide number of fledglings.

The 1998 season was another El Niño year, one of the most severe recorded, and least tern breeding at NAS Alameda was less successful. Only 90 young were fledged, more than a 70 percent reduction from 1997. Observations of delayed breeding, reduced fish catch, and the highest non-predator mortality of young ever observed (about 50 percent) (L. Collins, pers. comm. 1999) suggest food limitation and associated problems as a cause. In 1999, the number of nesting pairs at NAS Alameda may have declined substantially (K. Sanchez, pers. comm. 1999).

California Brown Pelican

The brown pelican was protected as endangered on October 13, 1970 (35 **FR** 16047). A detailed account of the taxonomy, ecology, and biology of the brown pelican is presented in the approved Recovery Plan for this species (Service 1983). Supplemental or updated information is provided in the Service's September 17, 1996, Biological Opinion on the U.S. Bureau of Land Management's authorization for the construction of the proposed Bal'diyaka Interpretative Center in Coos Bay, Oregon, which is hereby incorporated by reference.

Brown pelicans can arrive in northern California, after their breeding season is completed, as early as April or May, but the majority of birds typically arrive in July and stay through September (D. Jaques-Strong *in* Symposium Proceedings). Breakwater Island, located in the offshore waters just south of the western end of NAS Alameda, supports the most significant loafing/night roost for brown pelicans in San Francisco Bay Typically, Breakwater Island supports more than 400 brown pelicans during the non-breeding season, but in July 1997, the island supported more than 1,000 brown pelicans. Open water around Breakwater Island and in other parts of San Francisco Bay, including areas around Oakland Harbor, provide foraging, loafing and roosting habitat for brown pelicans. According to the *Biological Assessment for the Berths 55-58 and Oakland Harbor Navigation Improvement Projects* prepared by Entrix, Inc. (December 9, 1997, revised April 24, 1998) 16 brown pelicans were recorded near the project site at Oakland Harbor during surveys performed in 1997.

Environmental Baseline

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and the ecosystem in the action area. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area (50 CFR §402.02).

Factors Affecting Environment Within the Action Area

The factors presenting risks to naturally-reproducing populations of least tern and brown pelican are numerous and varied. A number of documents have addressed the history of human activities, present environmental conditions, and factors contributing to the decline of least tern and brown pelican. For example, the Service has prepared or assisted in the preparation of numerous documents focusing on status and recovery of these species, including the *California Least Tern Recovery Plan*, *California Brown Pelican Recovery Plan*, (USFWS, 1983), Programmatic Environmental Impact Statement/Report for the CALFED Bay-Delta Program (July 2000), and the Programmatic Environmental Impact Statement for the Central Valley Project Improvement Act (October 1999). All provide excellent summaries of historical and recent environmental conditions in the coastal and San Francisco Bay areas of California. For the purposes of this document, a general description of the environmental baseline for the least tern and brown pelican listed under the Act is based on a summarization of these documents.

Coastal Areas

Human development along coastal areas has brought disturbance to the birds in their breeding, resting, and feeding habitats. Nesting colonies of least terns and brown pelicans are especially sensitive to human disturbance.

The least tern has been most affected by the construction of the Pacific Coast Highway early in the century. With it, previously undisturbed beach areas became accessible and soon children, dogs and cats were disrupting tern nesting (Chambers 1908, Edwards 1919, Massey 1974). The buildup of human use of the beaches displaced more and more colonies at the same time their Bay feeding areas were being developed, filled in, and polluted. By the 1940's, most terns were gone from the beaches of Orange and Los Angeles counties (Cogswell 1947), and they were considered sparse everywhere (Grinnell and Miller 1944). Continuing loss of both nesting and feeding habitat and high levels of human disturbance at remaining colonies have been responsible for the continued decline to the present (Craig 1971).

While the California Brown Pelican is still found in its original range, its breeding colonies in California, located in the Channel Islands National Park at West Anacapa Island and the Santa Barbara Islands, continue to decline. California brown pelicans were threatened with extinction in the 1970's due to the use of the pesticide DDT. This chemical gets into the food chain and affects the birds calcium metabolism, resulting in thin-shelled eggs that break during incubation. DDT use was banned in the U.S. in 1972, and the brown pelican is recovering from the chemical contamination. However, DDT is still manufactured for export and it's effects in the environment linger. Food availability is now the major cause of concern. The Pacific mackerel, Pacific sardine, and the northern anchovy are important food for the pelican, especially during the breeding season. By the early 1900's commercial over-harvesting of these fish had resulted in less food availability during this critical time.

San Francisco Bay

Profound alterations to the estuarine habitat of San Francisco Bay began with the discovery of gold in the middle of the 19th century. Dam construction, water diversion, hydraulic mining, and the diking and filling of tidal marshes soon followed, launching San Francisco Bay into the era of rapid urban development and coincident habitat degradation. In general, the human activities that have affected these avian species and their habitats within the action area consist of: (1) loss of adequate nesting habitat; (2) land use activities such as urban development and landfill that degrade and transform aquatic habitat; (3) pollution; (4) dam construction and water development activities that can affect water quantity, timing, and quality in San Francisco Bay; (5) introduction of non-native species; and (6) ecosystem restoration.

Loss of Nesting Habitat. Only three least tern nesting areas currently exist in the San Francisco Bay area: Oakland Airport, PG&E Pittsburg power plant, and NAS Alameda. The Oakland Airport site has not been used in years and the Pacific Gas and Electric Pittsburg site supports only one to four pairs each year. The site at NAS Alameda remains one of the most important "source" populations in California, with an estimated 244 pairs of least terns nesting in the colony.

Land Use Activities. Historically, the tidal marshes of San Francisco Bay were a highly productive estuarine environment providing sufficient fish prey species for the least tern and brown pelican. Land use activities since the 1850's associated with urban development, mining, and agriculture have significantly altered habitat quantity and quality in San Francisco Bay, and contributed to ecosystem degradation.

Urbanization has been a major influence on the land surrounding the estuary. In the past 150 years, the diking and filling of tidal marshes have decreased the surface area of San Francisco Bay by 37 percent. More than 500,000 acres of the estuary's historic tidal wetlands have been converted to farms, salt ponds, and urban uses. Less than 45,000 acres of the estuary's historic tidal marshes remain intact, a reduction of 92 percent (San Francisco Estuary Project 1992). Today, nearly 30 percent of the land in the nine counties surrounding San Francisco Bay is urbanized. The increase in urban land reflects the growth of the human population. There are now more than 7.5 million individuals living in the 12 Bay Area counties, making the region the fourth most populous metropolitan area in the United States. These changes have reduced the acreage of valuable farm land, wetlands, and riparian areas, and have increased pollutant loadings to the estuary. Installation of docks, shipping wharves, marinas, and miles of rock rip rap for shoreline protection has also contributed greatly to habitat degradation within the estuary.

Pollution. Industrial, municipal, and agricultural wastes have been discharged into the waters of San Francisco Bay with major historical point sources including wastes from fish and fruit/vegetable canneries, and municipal sewage. The large-scale pollution of the estuary was partially relieved by the passage of the Clean Water Act in 1972, resulting in the construction of sewage treatment plants in all cities. Non-point sources of pollution, such as urban and agricultural runoff, continue to degrade water quality.

Dam Construction and Water Development. Hydropower, flood control, and water supply dams of the Central Valley Project (CVP), State Water Project (SWP), and other municipal and private entities have affected water quantity, timing, and quality in San Francisco Bay. These altered streamflows and the resulting inflow to San Francisco Bay have effected the natural ecosystem. Depleted inflow to San Francisco Bay has contributed to higher water temperatures and lower dissolved oxygen levels. Additionally, the seasonal distribution of freshwater inflow differs from historical patterns. The magnitude and duration of peak flows during the winter and spring are significantly reduced by water impoundment in upstream reservoirs. During the summer and early fall, inflow to San Francisco Bay may be greater than historical levels due to deliveries of municipal and agricultural water supplies. Overall, present day water management practices in the Central Valley reduce natural flow variability by creating more uniform flows year-round that diminish natural channel forming, riparian vegetation growth, and food web functions.

Introduction of non-native species. As native fishes became depleted in the late 19th century, non-native species were brought in to the Bay and delta, including American shad, striped bass, common carp, and white catfish. As their populations boomed, those of native fishes declined further. Introduction of non-native species accelerated in the 20th century through deliberate introductions of fish and unintended introductions of competitive invertebrates through ballast water of ships. Establishment of non-native species was probably facilitated by altered hydrologic regimes and reduction in habitats for native species. The introduction and spread of non-native species in San Francisco Bay has affected native species, including listed avian species, by competing with them for food and habitat, and preying on native species.

Ecosystem Restoration. Preliminary, significant steps towards the largest ecological restoration project yet undertaken in the United States have occurred during the past five years and continue to proceed in California's Central Valley. The CALFED Program and the Central Valley Project Improvement Act's (CVPIA) Anadromous Fish Restoration Program (AFRP), in coordination with other Central Valley and Bay Area efforts, have implemented numerous habitat restoration actions. A few of these restoration projects, primarily land acquisition and wetland restoration, include actions within the San Francisco Bay area. Restoration of wetland areas typically involves flooding lands previously used for agriculture, thereby creating additional wetland areas that could serve as rearing habitat for fish prey species of the least tern and brown pelican, and could, if associated with other restoration actions, possibly provide nesting habitat for the least tern and other bird species.

EFFECTS OF THE ACTION

Endangered Species Act implementing regulations define "effects of the action" as "the direct and indirect effects of an action on the species or critical habitat...." Direct effects include those actions that are the direct result of the proposed action, and include interrelated actions (actions that are part of the larger proposed action and depend on the larger action for their justification) and interdependent actions (actions having no independent utility apart from the proposed action) that will be added to the environmental baseline. Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur (50 C.F.R. § 402.02).

The East Span Project could result in harassment, harm, injury, and death of the least tern and brown pelican. The proposed East Span Project:

a. Could result in death or injury of individuals of either species venturing too close to pile driving operations through subjection to high-level sound pressure waves;

b. Would directly impact feeding success for both species by temporarily and permanently impacting prey-fish species habitat, and temporarily reducing quality of open water foraging habitat;

c. Could impact overall the health of both species through resuspension of contaminants associated with dredging operations; and

d. Benefit both species, through ecosystem restoration and habitat enhancement.

Total direct permanent and temporary project impacts would occur within approximately 3.60 acres of eelgrass habitat and 4.99 acres of intertidal sand flat habitats. Eelgrass habitats are essential for prey-fish production for the least tern, and intertidal sand flats provide foraging and roosting areas. These impacts occur in areas known as special aquatic sites. The majority of project impacts will occur near the Oakland Touchdown area due to dredging for a temporary barge access channel, placement of fill to construct a new westbound roadway, relocation of Caltrans' existing maintenance road, and permanent shading from the new east and westbound roadways. Small impacts to eelgrass beds will occur adjacent to YBI to construct a temporary barge dock.

The project may temporarily impact special aquatic sites, including eelgrass and intertidal sand flats, and open waters of the Bay over the estimated seven years of bridge construction and demolition. Impacts may occur through the discharge of construction and demolition materials and debris, indirect impacts from equipment access and changes to erosion and sedimentation during project dredging and fill placement.

The project will directly impact the beneficial uses of waters of the State for estuarine habitat and preservation of rare and endangered species through construction stage impacts including pile driving. Pile driving was shown to kill fish during a pilot project for the new bridge. FHWA/Caltrans will contribute $10.5 million to habitat restoration and enhancement in the Bay and is working with the Service to develop a mitigation plan.

Project Pile Driving

Project-related Impacts on Least Tern and Brown Pelican

The pathologies associated with exposure to drastic changes in pressure are collectively known as barotraumas. These include hemorrhage and rupture of internal organs, including the swim bladder and kidneys in fish. Death can be instantaneous, occur within minutes after exposure, or occur several days later. Mammals are known to suffer cardiovascular barotraumas caused by expansion of gas bubbles in the pulmonary capillaries, coronary arteries, internal carotid artery, or the cerebral artery. Bubble expansion in blood vessels can cause an embolism or blockage leading to heart attack or stroke, or a rupture causing hemorrhage. Other tissues with gas-filled voids, such as

swim bladders, bowel, sinuses, and lung can perforate and hemorrhage when exposed to blast and high-energy impulse noise underwater (Gisiner, 1998). Barotrauma is believed to have contributed to the recent beaching and deaths of whales in the Bahamas (Malakoff, 2001).

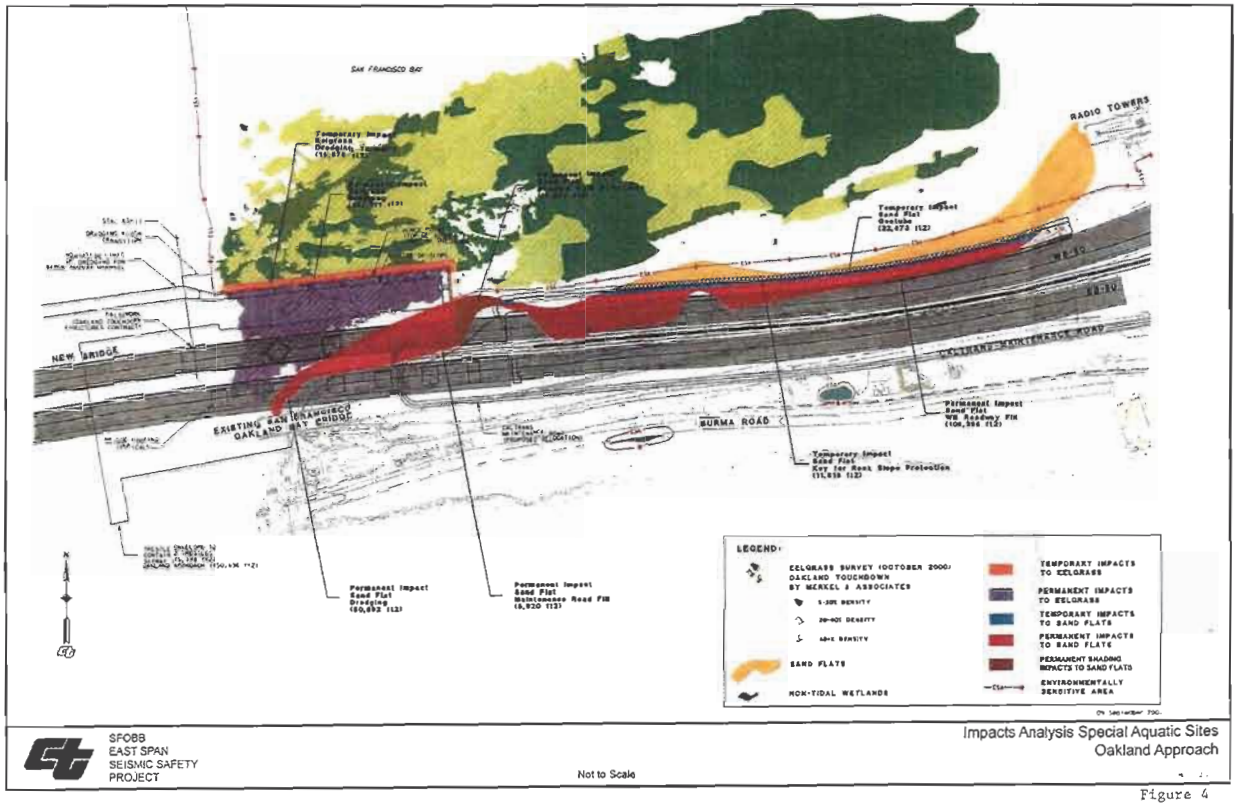
Avian species in the project area exposed to high sound pressure levels associated with project pile driving may experience mortality, slight degree of injury, stress, a startle response, or no effects whatsoever. The degree of effect depends on many factors including:

- Size and force of the hammer strike
- Distance from the pile
- Depth of the water around the pile
- Depth of the species in the water column
- Amount of air in the water
- The texture of the surface of the water (size and number of waves on the water surface)
- Bottom substrate composition and texture
- Size of species
- Type of species
- Physical condition of individual organism
- Effectiveness of the Bubble Curtain sound/pressure attenuation technology

In addition to the direct impacts of pile driving on adult least terns and brown pelicans, nestling least terns might be impacted at NAS Alameda as well. If auditory functions of adult least terns were impaired as a result of foraging near project-related pile driving, those individuals could have difficulty orienting to feed their young. Since colonial nesting seabirds, upon returning from foraging activities, typically orient to nestlings through audible cues, impacts to young least terns could occur as a result of a lack of appropriate parental feeding.

Project-related Minimization Measures

During a Pile Installation Demonstration Project in 2000, planned pile driving activities for the East Span Project were tested. Test results showed mortality in fish species in the Bay as a result of barotraumas. It also identified behavior modifications in associated marine-related bird life which prompted concern of the Service for the least tern and brown pelican. During this test period, various species of gulls spp., Brandt's cormorants and brown pelicans were seen to feed on moribund fish associated with pile driving operations. However, most were noted to feed at distances beyond that identified as an impact to fish species in related studies (at or beyond 300 meters). These interactions did, however, prompt evaluation of methods that could attenuate the effects of high sound pressure levels associated with project pile driving operations.



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Impacts Analysis Special Aquatic Sites
Oakland Approach

Figure 4

Mr. Michael G. Ritchie

Bubble curtains have been used for marine pile driving on only three known projects: The Hong Kong Aviation Fuel Transfer Facility, the Vancouver, British Columbia, Canada, Place Cruise Ship Terminal, and the San Francisco-Oakland Bay Bridge Pile Installation Demonstration Project (PIDP). Of these, the Vancouver project was the most successful in reducing underwater sound pressure levels during pile driving. The reported decibel reduction was greater than 17 dB (Greene 2001). A bubble curtain is planned as an integral part of East Span Project pile driving operations for large diameter piles. While the success of bubble curtains to reduce the impact of high-level sound on avian species is unknown, such devices have been shown to provide protection to fish species (Keevin et al 1997). It is assumed the "muffling" of high-level sounds provided by bubble curtains would also provide a similar benefit for avian species traveling underwater.
The planned bubble curtain should provide an attenuation of peak pressures of at least 10 dB (Greene 2001). Using the Canadian guideline of 4.5 psi (210 dB re. 1 μPa) as a safe level for fish, the estimated safe range (distance from source) for fish during pile driving on the East Span Project is 310 feet (95 meters) for the operation of the large hammer at 1700 kJ without a bubble curtain. The estimated safe range for fish is 144 feet (44 meters) if the same hammer is employed with a bubble curtain, assuming a 10dB reduction in sound pressure levels (Greene 2001). This safe range is also assumed for least terns and brown pelicans

As the acoustic pressure wave leaves the steel pipe pile and spreads throughout the water column, the pressure drops off according to the distance due to the spreading out of the acoustic energy. In deep water the rate of attenuation or transmission loss is as much as a halving of the pressure for each doubling of the distance. In shallow water where much of the acoustic energy can be absorbed by the bottom and reflected off the surface back down to the bottom and even backwards towards the pile, the rate of attenuation is much higher. The reduction in sound pressure levels near the surface is especially important in assessing the acoustic impacts on salmonids. The acoustic zone of impact for a source that extends from the surface to the bottom may be visualized as a large inverted bowl with the narrow end or bottom of the bowl near the water surface and the rim or wide part of the top of the bowl near the bottom of the Bay. This means that fish swimming near the surface must be closer to the pile than fish near the bottom to experience the same degree of impact. Because least terns and brown pelicans typically feed no more than 1 meter deep, this same level of impact is assumed.

The area of greatest risk to fish species is within approximately 10 meters (30 feet) of the pile. Here the sound pressure levels are great enough to kill most fish immediately. Fish further away have been shown to sustain injuries that render them more vulnerable to predators and thus may be considered delayed mortalities. Fish still further out from the pile may exhibit temporary abnormal behavior indicative of stress or exhibit a startle response but not sustain harm or an injury to an organ. These various distance or radiuses may be termed the Immediate Mortality Zone (IMZ), the Delayed Mortality Zone (DMZ)

and the Behavioral Modification Zone (BMZ). The radius of each zone is unknown but the use of the bubble curtain suggests a 50-85% reduction (10-15 dB) in the size of the zones and a corresponding protection of fish resources over the potential impact without the bubble curtain.

Summary

While impacts to least terns and brown pelicans, and their prey-fish species can occur as a result of pile driving operations, the following measures greatly minimize potential impacts

- placement and operation of a bubble curtain or other approved marine pile driving energy attenuator at sites associated with the driving of large diameter steel piles;
- temporary nature of pile driving operations;
- avoidance of prey species from pile driving areas; and
- avoidance of project areas due to above water, project-related sound and activity levels.

Loss and Reduction in the Quality of Foraging Habitat and Prey Species

Least Tern and Brown Pelican Prey Species

Collection of dropped fish, which is an indication of fish prey items selected by least terns, at NAS Alameda from 1981 to 1995 indicates northern anchovy (*Engraulis mordax*), San Francisco topsmelt (*Atherinops affinis affinis*), jacksmelt (*Atherinops californiensis*), and unidentified Atherinidae species comprised 85.4 percent of the total percentage of fish collected at the least tern colony. The brown pelican is highly reliant upon northern anchovies as a food source.

Northern anchovies mostly spawn in open waters of the Pacific Ocean, but eggs are abundant in San Francisco Bay from May through September (Herbold *et al.* 1992). Within San Francisco Bay, northern anchovies spawn in channels, but larvae mostly occur in shallow water areas (McGowan 1986). While anchovy larvae have been documented to tolerate lower water clarity than anchovy eggs, eggs were found to be most abundant in parts of San Francisco Bay with low concentrations of zooplankton and clearer water (Herbold *et al.* 1992). This information suggests that decreased water clarity associated with project-related dredging and disposal of dredged sediments could reduce the productivity and/or availability of northern anchovies, a principal fish prey item for least terns and brown pelicans in general.

Anchovy adults and juveniles typically enter San Francisco Bay in April and leave in the fall (Herbold *et al.* 1992). Large numbers of northern anchovies are present in central San Francisco Bay in May, June, and July (Figure 42 in Herbold *et al.* 1992). San Francisco topsmelt spawn in San Francisco Bay from April to October with peak spawning in May and June (Wang 1986). Jacksmelt adults enter bays and estuaries in late winter and early spring to spawn, and spawn in San Francisco Bay from October to early August (Wang 1986). Both San Francisco topsmelt and jacksmelt use submerged vegetation, including eelgrass, as a spawning substrate.

Project-related Impacts to Least Tern and Brown Pelican

The quality of foraging habitat for least tern and brown pelican will be affected by project-related dredging and disposal activities. Dredging practices associated with the East Span Project will result in minimal, site specific losses of prey species for the least tern and the brown pelican. Effects include entrainment of juvenile prey-fish species (Dutta and Sookachoff 1975, Boyd 1975, Armstrong *et al.* 1982, Tutty 1976) and behavioral (Sigler *et al.* 1984, Berg and Northcote 1985, Whitman *et al.* 1982, Gregory 1988) and sub-lethal impacts to prey species from exposure to increased turbidity (Sigler, 1988, Sigler *et al.* 1984, Kirn *et al.* 1986, Emmett *et al.* 1988, Servizi 1988); effects from redistribution and/or release of contaminants (explained further below), with increased potential for chronic or acute toxicity; increased prey mortality from predatory species benefitting from activities associated with dredged material disposal; and changes in the native sediment characteristics near disposal sites and shifts in sediment dynamics that may alter available food supply (Morton 1977).

The magnitude of effect from dredging will also vary with the life stage of the prey species. In general, adult fish will avoid areas of dredging and disposal of dredged material. However, juveniles may be less able to avoid or leave the affected areas, or may expose themselves to increased predation risk by moving out of an affected area. Increased turbidity will also impact feeding success of the birds by hampering visual cues necessary to spot fish prey from the air. However, because fish tend to avoid areas of high turbidity, impacts are expected to be minimal as they should move to clearer water.

Fish could become more abundant at the water surface because the sediment plume produced during dredging operations tends to be concentrated below 7 meters or about 23 feet MLLW based upon a one-day study of single clamshell dredge operating in Inner Harbor. However, increased turbidity associated with continuous dredging by multiple dredges, sediment overflow from barges, and disposal of dredged sediments could either individually or collectively reduce in-water visibility for least terns and brown pelicans at the water surface and at shallow depths, thus reducing their overall foraging effectiveness. These adverse effects could be most pronounced during the summers when least tern adults are feeding unfledged young with high energetic needs for growth and development. Further, sediment dispersed during dredging operations could cover

eelgrass and reduce light in eelgrass beds adjacent to the project site, thus reducing their productivity and suitability as fish spawning habitat.

The majority of the impacts to eelgrass would occur in the intertidal areas just to the north of the Oakland Touchdown as a result of dredging for a barge access channel (Figure 4). There would be relatively minor impacts to eelgrass beds at Clipper Cove from the construction of a temporary barge dock (Figure 5). Eelgrass beds are known to occur in shallow waters, less than 6.56 feet (2 meters) deep, within the project study area. Eelgrass beds were observed on the north side of the Oakland Touchdown extending to depths ranging from about 3.5 to 5 feet (1 to 1.5 meters). The eelgrass bed near the shore of the Oakland Touchdown appears to be young which suggests that the bed may be increasing in size and density. Eelgrass beds are highly productive habitats for numerous species of fish including Pacific herring, San Francisco topsmelt, and jacksmelt, which use eelgrass as spawning habitat.

Temporary impacts to eelgrass near the Oakland Touchdown may result from increased turbidity as a result of dredging. Increased turbidity from this activity would be localized Other activities that could contribute to increased turbidity are propeller wash from tugboats moving barges; mud boils resulting from the geotube and the placement of engineered fill; and pile driving for both temporary trestles and the permanent bridge structure. At YBI, the activities that could contribute to increased turbidity are propeller wash from tug boats moving barges and pile driving.

Project-related Minimization Measures

To minimize impacts to least tern and brown pelican foraging habitat and associated prey species, FHWA/Caltrans' proposes the following measures:

On-site Minimization - Approximately 0.55 acres (0.22 hectares) of eelgrass will be harvested from the footprint of the barge access channel prior to dredging, planting test plots in adjacent eelgrass beds and monitoring to evaluate performance. After construction is complete, the barge access channel will be restored to its pre-construction bathymetry up to approximately 1.73 acres (0.70 hectares) and the area would be replanted with eelgrass from an adjacent donor site. Additionally, FHWA/Caltrans would minimize impacts to eelgrass beds by implementing a turbidity control program. The program would include measuring turbidity and light attenuation at the project boundary to compare with ambient conditions within the eelgrass beds. These measures would be used to monitor additional sediment transport caused by dredging and other construction activities within the project boundaries. If measured turbidity or light attenuation exceed the established limits, as determined by monitoring, appropriate control measures shall be implemented by the Contractor or the construction activity would be suspended to reduce turbidity and light attenuation to within the described limits.

Offsite. In addition to on-site mitigation, FHWA/Caltrans proposes to provide $10,500,000 to fund mitigation at offsite locations to restore, enhance, or create new aquatic habitat and transitional uplands within the San Francisco Bay area. Some of these restoration actions would provide benefits to various life stages of prey species for the least tern and brown pelican.

Project Area Proximity to Least Tern Nesting Colony at NAS Alameda

The least tern is opportunistic in its foraging habits, and efforts to precisely define "essential" feeding habitats or localities are difficult. Prior to post-fledgling dispersal from breeding colonies, most foraging activity occurs within 2 miles of the nesting sites (Atwood 1983). The project site is 2.7 to 3 miles away from the breeding colony at NAS Alameda and should be beyond the distance adult terns are willing to fly to forage and return with food for pre-fledgling young (Figure 6).

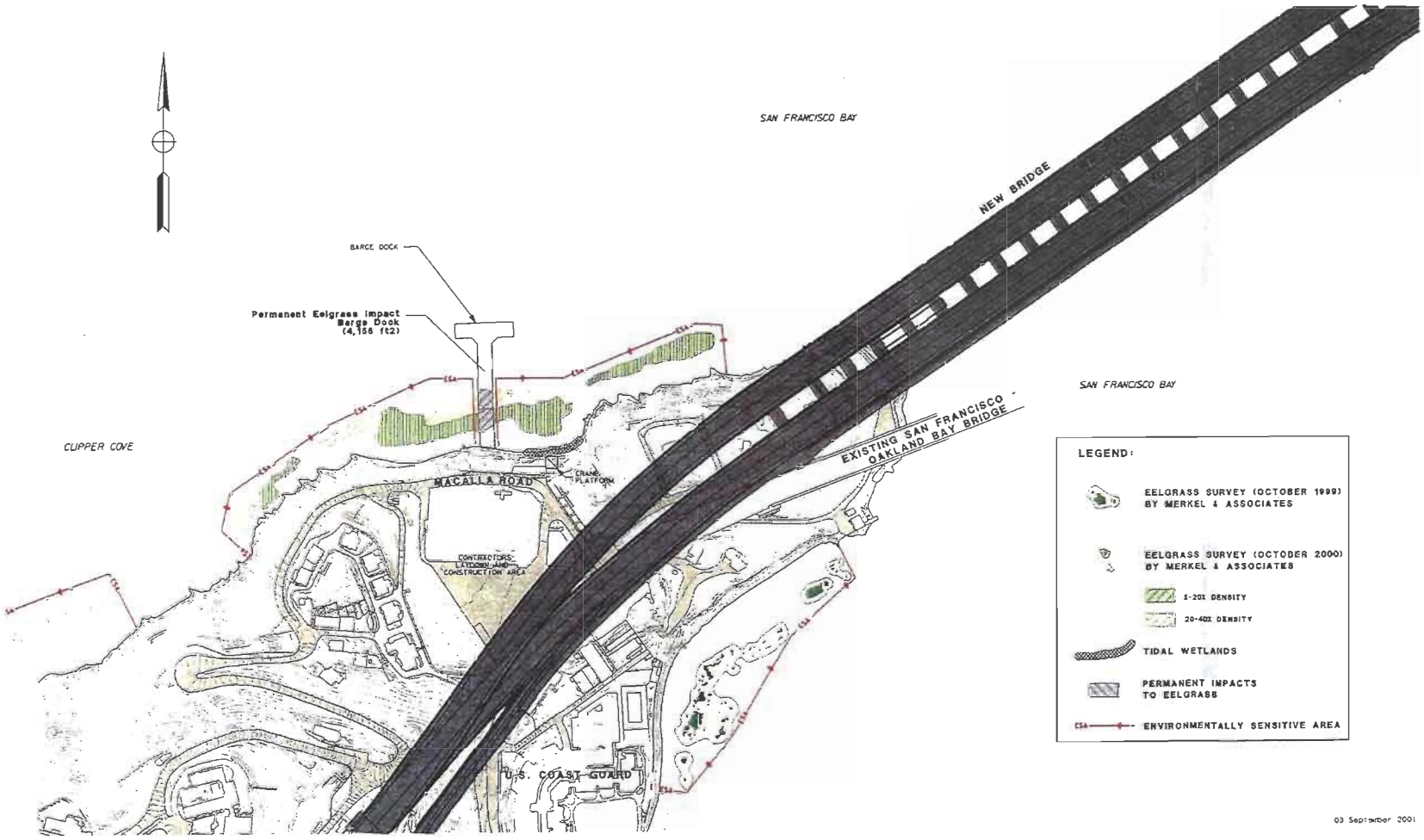
Significance In-relation to Feeding Habitat Area

The California least tern enters the Bay area in mid to late April each year and shortly thereafter begins mating and nesting activities. Prior to and after nesting, the species can forage throughout the Bay, and individuals have been seen at National Wildlife Refuges in the north Bay and salt ponds in the south Bay. Subsequent nesting, feeding ranges become much more limited and the species typically stays within a 2 mile radius of the nest site (Atwood 1983). At NAS Alameda, since approximately one half of that area would be over water, the typical least tern foraging habitat when nesting would closely approximate 4,000 acres. If the species ventured beyond the 2 mile area to include the project area (3 miles), the least tern foraging habitat would closely approximate up to 9,000 acres. Because of the size of the feeding area assumed to be available to least terns if they were to venture to the project site, the general project-related impact area (assumed less than 20 acres at one time), and the proximity of the NAS Alameda least tern colony to other eelgrass-related feeding areas (Figure 6), impacts on least tern feeding are assumed to be minimal.

The California brown pelican enters the Bay area as early as April each year and forages and rests until it leaves in September. Because the brown pelican has been known to forage throughout the Bay, an area of approximately 832,000 acres, the potential for project-related impacts on brown pelican feeding are assumed to be minimal.

Summary

While impacts to foraging habitat and prey-fish species for least terns and brown pelicans can occur as a result of project-related pile driving, dredging, and disposal operations, they likely will be greatly reduced due to the following:



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Impacts Analysis Special Aquatic Sites
Yerba Buena Island

Figure 5

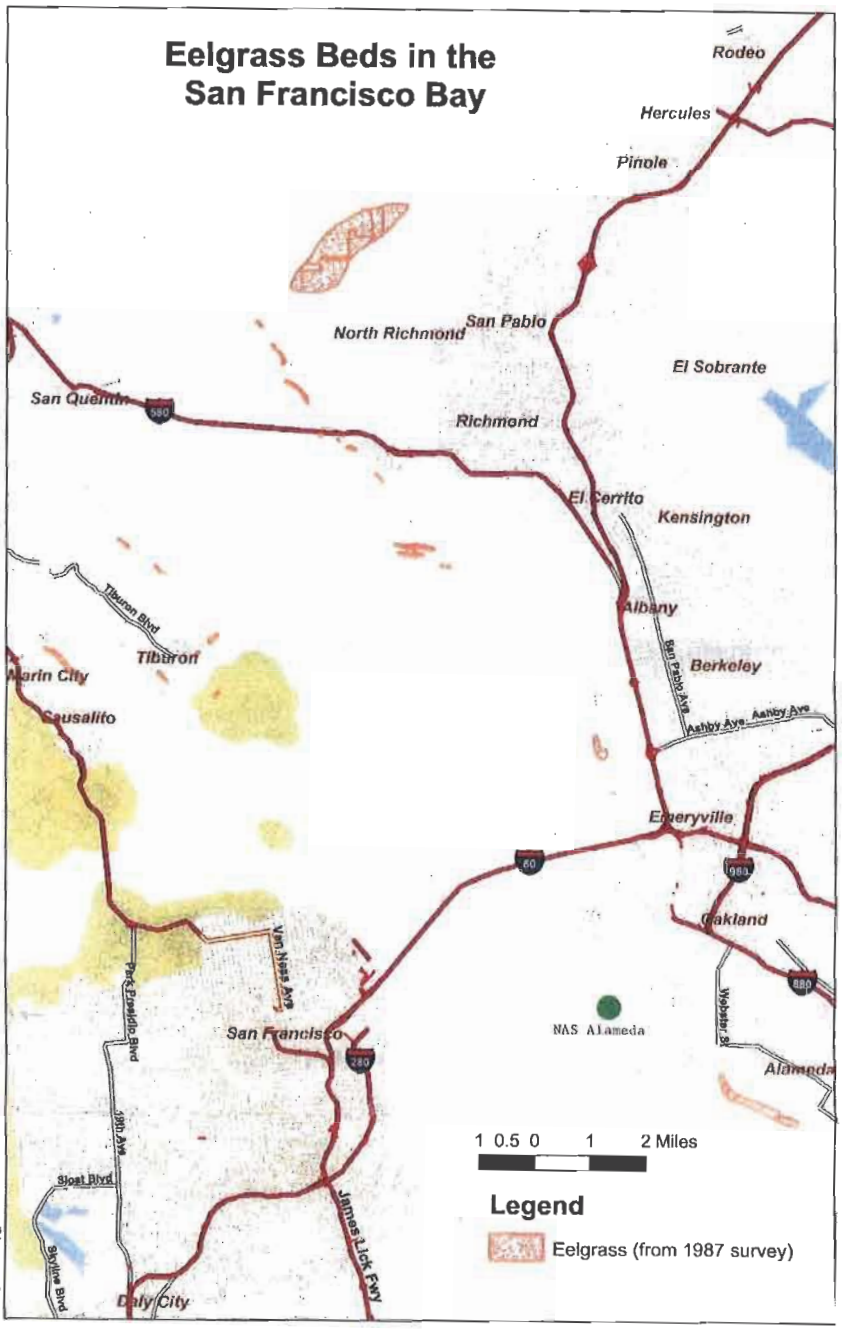
Eelgrass Beds in the San Francisco Bay
Rodeo
Hercules
Pinole
San Pablo
North Richmond
El Sobrante
San Quentin
Richmond
El Cerrito
Kensington
Albany
Berkeley
Tiburon Blvd
Tiburon
Marin City
Sausalito
Ashby Ave
Emeryville
Oakland
Van Ness Avg
Park Presidio Blvd
San Francisco
NAS Alameda
Webster St
Alameda
19th Ave
Sloat Blvd
Skyline Blvd
Daly City
James J Lick Fwy
1 0.5 0 1 2 Miles
Legend
Eelgrass (from 1987 survey)

Figure 6

the amount of dredging for the East Span Project is small and effects to prey species is anticipated to be correspondingly small;

avoidance of prey species from project-related pile driving, dredging, and disposal areas;

limited impact area in relation to known least tern nesting and feeding areas and brown pelican resting and feeding areas;

transitory use of the project area as feeding habitat by least terns and brown pelicans; and

temporary nature of pile driving, dredging, and disposal operations.

Water Quality-related Impacts

Project-related Impacts to Least Tern and Brown Pelican

The proposed East Span Project could increase contaminant-related adverse effects to least terns and brown pelicans in several ways. Topsmelt embryos and larvae can be affected by pollution (Singer *et al.* 1990, Anderson *et al.* 1991, Goodman *et al.* 1991, Hemmer *et al.* 1991), and jacksmelt also may be impacted by pollution. Egg shell thinning by brown pelicans has been attributed to high levels of DDT. Sediments within areas of the Bay are known to be contaminated with heavy metals, PCBs, PAHs, and DDT. Increased suspension of contaminated sediments could reduce productivity and the abundance of suitable fish prey for least terns and brown pelicans. Increased levels of petroleum-based pollutants could enter foraging areas with stormwater runoff from development of project areas and contaminate fish prey for least terns. Increased boat and ship activity associated with dredging operations also could increase the risk of spillage events in least tern and brown pelican foraging areas.

Contaminants

In the aquatic environment, most anthropogenic chemicals and waste materials including toxic organic and inorganic chemicals eventually accumulate in the sediment. Contaminated sediments may be directly toxic to aquatic life or can be a source of contaminants for bioaccumulation in the food chain (Ingersoll 1995). Fine sediments in the project dredging areas increase the likelihood of a problem with contaminants, because this fraction consists of particles with relatively large ratios of surface area to volume, which increase the sorptive capacity for contaminants.

Caltrans performed sampling, chemical analyses and acute toxicity bioassays of Bay sediments from the project area to determine the suitability of dredged material for disposal. Chemical analyses were performed for priority pollutant metals; total and

dissolved sulfides; Total Recoverable Petroleum Hydrocarbons (TRPH); phthalate esters; Polynuclear Aromatic Hydrocarbons (PAHs); pesticides; Polychlorinated Biphenyls (PCBs); mono-, di-, tri- and tetrabutyltin and Total Organic Carbon (TOC). Biological analyses were conducted for 96-hour L/SP bioassay, 10-day solid phase bioassay and 28-day bioaccumulation.

The results of these studies showed a general absence of significant contamination, with low or non-detectable concentrations of chemical contaminants of concern except at two groups of dredge sites (USACOE letter dated October 31, 2000).

Material from the upper 12 feet of testing locations SFOBB-N-2 and SFOBB-N-5 is not suitable for unconfined aquatic disposal because test results showed significant solid phase toxicity to Nephtys when compared to the reference sites. However, no amphipods exhibited significant toxicity in these samples. The DMMO agencies noted that it is unusual to find significant solid phase toxicity to Nephtys and a high survival in Ampelisca. They suggested that FHWA/Caltrans might want to consider higher resolution tests to confirm these results (Army Corps letter to Caltrans dated October 31, 2000). FHWA/Caltrans chose to accept the initial results and opt for upland disposal of this material.

Material from the upper 12 feet of Site SFOBB-N-1 is also unsuitable for unconfined aquatic disposal or to wetland surfaces due to excessive bioaccumulation of individual constituents of polynuclear aromatic hydrocarbons (PAHs).

Although the DMMO determined that the majority of dredged material from the project is suitable for unconfined aquatic disposal, contaminants are present. They include oil and grease, TRPH, chlorinated pesticides (DDD, DDE, and DDT[7]), metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc), organotins, and 12 PAHs. Concentrations appear unlikely to result in any acute toxicity to prey species as a result of the temporary resuspension of contaminated sediments during project dredging.

Ammonia and Dissolved Oxygen

Two common by-products produced in anaerobic sediments containing adequate concentrations of organic matter are ammonia and hydrogen sulfide, which are highly toxic and produced by anaerobic aquatic microorganisms. Dillon and Moore (1990) report that ammonia can exert toxicity at relatively low concentrations on fish and other

[7] These are Persistent Organochlorine Compounds that are pesticides used historically for mosquito abatement and as insecticides; they are no longer commercially manufactured. DDT is gradually metabolized into DDE and DDD. Commercial DDT was a mixture of DDT, DDE and DDD. DDT: dichloro-diphenyl-trichloro-ethane; or (1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane). DDE (1,1-dichloro-2,2-bis(chlorophenyl) ethylene); DDD: (1,1-dichloro-2,2-bis(p-chlorophenyl) ethane).

aquatic organisms. The release of ammonia during dredging and the disposal of dredged material could affect aquatic species as it is resuspended in the water column.

Many freshwater sediments, in areas where urban and industrial inputs of organic materials have occurred, contain elevated levels of ammonia. The un-ionized form of ammonia (NH3), which predominates at slightly alkaline conditions, has been shown to be the most toxic form for cold water fish (Burton and MacPherson 1995). Dillon and Moore (1990) conducted a literature review and found that concentrations of un-ionized ammonia reported to be acutely toxic to freshwater fish species range from 0.083 to 4.2 mg/l NH3, and results from chronic studies ranged from 0.0017 to 0.612 mg/l NH3. They cited a study (USACOE 1975) conducted at the SF-11 disposal site that reported ammonia concentrations of 0.05-0.15 mg/l pre-disposal and 0.05-0.3 mg/l post-disposal, both of which fall within the range of both acute and chronic effects to fish. As for the sensitivity of the various fish species tested, salmonids were the most sensitive of the fish species used in studies reviewed by Dillon and Moore (1990). They also found that the few studies conducted on the toxicity of ammonia to salt water species indicate that salt water species are, in general, more sensitive than freshwater species. Dillon and Moore (1990) concluded that the ammonia concentrations reported during a disposal event at the SF-11 site did not appear to represent any potential for toxicity when compared to the acute toxicity concentrations for saltwater organisms published by USEPA (1985), although they did not provide either a list of the organisms or their acute toxicity thresholds. In 2001, the California Regional Water Quality Control Board San Francisco Bay Region (CRWCQB) set a limit on the discharge of ammonia from a wastewater treatment plant in the Central Contra Costa Sanitary District that uses secondary treatment. A discharge cannot cause ambient concentrations of unionized ammonia above an annual median of 0.025 mg/l, as well as limiting the instantaneous maximum to 0.16 mg/l.

For the East Span Project it appears unlikely that acute, short-term effects due to increased levels of ammonia at either the dredge site or the disposal site will occur due to the open environment at the disposal site, and to a slightly lesser extent at the dredge site. Un-ionized form of ammonia has great potential for adversely affecting prey fish species, but the concentrations anticipated at the dredge and disposal sites are unlikely to directly effect prey fish species. Effects, in a similar pattern as is described for turbidity, may occur through behavior modification resulting from avoidance of the increased concentration levels of ammonia near both sites.

A reduction in dissolved oxygen during dredging and disposal of dredged material has also been raised as having possible effects on aquatic organisms. LaSalle (1988) reported that a maximum reduction in dissolved oxygen of about 0.2 mg/l occurs in the vicinity of the dredge. This level of reduction in dissolved oxygen levels during dredging and disposal is not expected to adversely affect least tern and brown pelican fish prey species in San Francisco Bay.

Benthic Resources

Oliver *et al.* (1977) noted two phases of succession in benthic communities after disturbance (such as dredging or burial by disposal of dredged material) In the first phase, opportunistic species, such as polychaetes move into a disturbed area. In the second phase, organisms surrounding the disturbed area re-colonize the affected site. Reilly *et al.* (1992) concluded that dredging-induced habitat alterations are minor compared to the large-scale disturbance of habitat in San Francisco Bay occurring from natural physical forces, such as seasonal and storm-generated waves, although these events would primarily occur in shallow water.

Disposal of dredged material at SF-DODS would cause short-term sediment plumes and impact benthic resources. However, the amounts to be disposed of at this site are well under the 4.8 million cubic yards (3.7 million cubic meters) allowed per year, and would thus not result in impacts inconsistent with the LTMS.

Disposal of dredged material at the SF-11 disposal site would generate similar sediment plumes to those described above. The SF-11 disposal site has been used for decades and has a low biological standing crop of invertebrates. There will be some short-term impact to invertebrate colonies as a result of dredging and disposal, however, rapid recolonization rates indicate that this would be of minimal impact to any fish prey species for least tern or brown pelican. Efforts to limit sediment plumes at the dumpsite would not be required.

Summary

While impacts to least terns and brown pelicans can occur as a result of project-induced modifications in water quality, they are felt to be very minimal due to the following:

- the amount of dredging for the East Span Project is small and effects to prey species, associated with interrelated contaminant issues, is anticipated to be correspondingly small;

- avoidance of prey-fish species from project-related pile driving, dredging, and disposal areas;

- limited impact area in relation to known least tern nesting and feeding areas and brown pelican resting and feeding areas;

- transitory use of the project area as feeding habitat by least terns and brown pelicans; and

- temporary nature of pile driving, dredging, and disposal operations.

Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." For the purposes of this consultation, the action area encompasses central, north, and south San Francisco Bay bounded by the towns of Napa and Sonoma; the Golden Gate Bridge; Hwy 880, Alameda County; and Moffett Field NAS, Santa Clara County.

Non-Federal actions that may affect the action area include voluntary State or private sponsored habitat restoration activities, agricultural practices, water withdrawals and diversions, increased population growth, mining activities, and urbanization. Habitat restoration projects may have short-term negative effects associated with in-water construction work, but these effects are temporary, localized, and the outcome is typically a benefit to these listed species. Farming activities within or adjacent to the action area may have negative effects on San Francisco Bay water quality due to runoff laden with agricultural chemicals. Future urban development and mining operations in the action area may adversely affect water quality and estuarine productivity. Future land conservation and habitat restoration activities expected in the action area, such as those planned by the ongoing CALFED and CVPIA processes, are anticipated to offset some of the adverse effects associated with these non-Federal actions.

The most serious cumulative effect on least terns in the Bay area is the degradation of the Oakland International Airport nesting site as a result of red fox predation over several years. The Service has approached the Port, which has operational responsibility for some activities at the Oakland Airport, about conducting predator management, vegetation removal, and other activities to enhance and sustain least tern nesting activities at the Oakland Airport. However, not all management activities have been fully developed and implemented to provide adequate protection for least terns nesting at the Oakland Airport. Long term loss of the Oakland nesting site would leave only one nesting site in the Bay at NAS Alameda. The current situation with only one viable nesting site in the Bay makes this endangered species highly vulnerable to stochastic extinction in the Bay.

The Service is not aware of any cumulative effects on brown pelicans in the action area.

Conclusion

After reviewing the current status of the least tern and brown pelican; the environmental baseline for the action area; the effects of the proposed action, including proposed conservation measures; and the cumulative effects, it is concluded that the action, as proposed, is not likely to jeopardize the continued existence of endangered California least tern and California brown pelican. No critical habitat has been designated for these species; therefore, none will be adversely modified or destroyed.

INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as actions that create the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Harm is defined by the Service to include significant habitat modification or degradation resulting in death or injury to listed species by significantly impairing behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary and must be implemented by the FHWA, or made binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The FHWA has a continuing duty to regulate the activity covered by this incidental take statement. If the FHWA (1) fails to adhere to the terms and conditions of the incidental take statement, through enforceable terms added to the permit or grant document, as appropriate, or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

It is anticipated that take associated with construction and dismantling of the East Span Project will be in the form of mortality, injury and harassment through temporary and permanent habitat impacts and activities occurring during construction.

Habitat adjacent to both the dredge and disposal sites will be temporarily degraded due to localized turbidity produced by dredge and disposal activities. Foraging behavior of adult least tern and brown pelicans is likely to be disrupted by the plume of turbid water occurring during and immediately following dredging and disposal events. However, these impacts are not expected to result in take of these listed species. Post-breeding adult and fledgling aggregations of least terns are expected to move away from the project area and the NAS Alameda, as is typical for the species, to freshwater, estuarine, and protected shallow marine areas.

The Pile Installation Demonstration Project Immediate Mortality Zone for fish species was approximately 10-12 meters, using the 1700kJ hammer without sound attenuation (Caltrans 2001). Using the Canadian guideline of 4.5 psi (210 dB re: 1 Pa) as a safe level

for fish, the estimated safe range during large hammer pile driving with a bubble curtain on the East Span Project would be 144 feet (44 meters), assuming a 10 dB reduction in sound pressure levels (Greene 2001). Since limited information exists for bird species feeding underwater adjacent to such operations, in a worse-case scenario, it is assumed the estimated safe range during large hammer pile driving with a bubble curtain for least tern and brown pelican is the same. However, project-related pile driving impacts are not expected to result in take of these listed species, either as adult least terns and brown pelicans foraging near the project site, or as nestling least terns impacted by the loss or incapacitation of either or both parents.

We anticipate the proposed actions could result in harm of least terns throughout the life of the project. However, no direct loss of least tern nesting habitat is anticipated for the proposed action. The number of least tern adults that could be injured or killed can not be accurately estimated but is expected to be at most a very few individuals, given their transitory feeding nature, avoidance of human activity and noise, difficulty feeding in turbid water, and the placement and operation of the bubble curtain. We anticipate the proposed project would increase the probability or likelihood of harm to 2 least terns, resulting from adverse effects of project-related pile driving, dredging, and disposal operations. Additionally, we feel there is no risk of a population level effect.

As a result of project-related activities, about 20 acres (3.6 acres of eelgrass, 4.99 acres of intertidal sand flats, additional approx. 12 acres of dredge/disposal impacted areas) of least tern foraging habitat would be temporarily impacted at any one time during project-related operations. We anticipate the proposed East Span Project would increase the probability or likelihood of harassment to as many as 244 least tern breeding pairs and/or their eggs and/or chicks in any given year (estimated colony population at NAS Alameda).

This amount of incidental take could be greater in any given year if the number of breeding pairs at the colony site increases. It is difficult to quantify the incremental increase in mortality of least tern adults and/or their eggs and/or chicks from the proposed project, however, we anticipate that: (1) the fledgling-to-pair ratio in any given year would not be lower than 0.7, or (2) the average fledgling-to-pair ratio during any consecutive 3-year time span would not be lower than 1.1. Environmental conditions beyond agency control may affect the fledgling-to-pair ratio. For example, in the El Niño year of 1998, the ratio was 0.37. The Service will consider environmental conditions and the fledgling success of other nearby tern colonies (least terns and other species) when evaluating the responsibility of FHWA for any failure of the NAS Alameda least tern colony to meet these criteria.

We anticipate the proposed actions could result in harm of brown pelican throughout the life of the project, as well. The number of brown pelican adults that could be injured or killed can not be accurately estimated but is expected to be at most a very few individuals, given their transitory feeding nature, avoidance of human activity and noise,

difficulty feeding in turbid water, and the placement and operation of the bubble curtain. No direct loss of brown pelican nighttime roosting habitat is anticipated. While it is difficult to quantify the amount of incidental take associated with the proposed action, we anticipate harm to 2 brown pelicans could result from adverse effects of project-related pile driving, dredging, and disposal operations. Additionally, we feel there is no risk of a population level effect.

The same 20 acres identified of foraging habitat for least tern would be temporarily impacted for brown pelicans at any one time during project-related operations. Therefore, we anticipate the proposed East Span Project would increase the probability or likelihood of harassment to as many as 1,000 brown pelicans (maximum known roosting population at Breakwater Island just south of the western end of NAS Alameda, July 1997).

Effect of the Take

In the accompanying Biological Opinion, the Service has determined the anticipated level of take associated with the proposed action is not likely to jeopardize the continued existence of the endangered California least tern and endangered California brown pelican.

Reasonable and Prudent Measure

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize incidental take of the least tern and brown pelican.

> The potential for harassment, harm, or mortality to least terns and brown pelicans shall be minimized.

Terms and Conditions

To be exempt from prohibitions of section 9 of the Act, FHWA must comply with the following terms and conditions. These terms and conditions are nondiscretionary, and implement the reasonable and prudent measure described above:

> FHWA shall ensure the project is implemented as proposed, including the proposed biological conservation measures, except for the following additions, modifications, or clarifications:
>
> a. A Service-approved Monitoring Plan shall be developed for any project-related restoration project(s), including success criteria and contingency measures in the event success is not achieved.
>
> b. The Service shall approve any mitigation actions to ensure that adequate compensation of habitat value is provided for listed species.

Consultation Reporting Requirements

The Service shall be notified within twenty-four (24) hours of the finding of any injured or dead least terns or their eggs, or brown pelicans, or any unanticipated damage to least tern and brown pelican habitat associated with the proposed projects. Notification must include the date, time, and precise location of the specimen/incident, and any other pertinent information. The Service contact person in this Office's Endangered Species Division is Jan Knight (telephone 916/414-6600). Any dead or injured specimens shall be reposited with the Service's Division of Law Enforcement, 2800 Cottage Way, Suite W-2605, Sacramento, California 95825-1846 (telephone 916/414-6660).

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities intended to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The Service proposes the following conservation recommendations:

1 Study foraging use by least terns in the newly created or restored habitats within the Bay area and determine its ecological significance to supporting the least tern.

2. Study eelgrass habitat in the Bay area to determine its ecological significance and potential for restoration.

3 Assess the functional value of newly created or restored habitat in the Bay area for least terns.

4. Identify potential sources of contamination that could adversely affect successful foraging by least terns in newly created or restored foraging habitats in the Bay area .

5 Identify public use activities along the perimeter and within open water areas of any newly created habitat if it provides foraging or roosting habitats for least terns.

6. Fully consider inclusion of restoration and enhancement measures at the 3,298 acre Skagg's Island parcel in San Pablo Bay for provision of offsite and out-of-kind project-related compensation. Skagg's Island restoration would help tidal circulation to this San Pablo Bay wetland system, result in increased populations of

estuarine fishes[8], and potentially improve long-term feeding conditions for both the least tern and brown pelican.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation and conference on the proposed action outlined in your October 11, 2001, request for formal consultation. As provided in 50 CFR section 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, as previously described; (2) new information reveals that the actions may affect listed species or critical habitat in a manner not considered in this opinion; (3) the agency action is substantially modified in a manner that causes an effect to listed species not considered in this opinion; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions regarding this Biological Opinion, please contact Michael Hoover or Dan Buford at (916) 414-6600.

Sincerely,

for Cay C. Goude
Acting Field Supervisor

Enclosures

cc:
SFBNWRC, Newark, CA (M. Kolar)
EPA (Wetlands Section), San Francisco, CA
CDFG, Region III, Yountville, CA
CDFG, Environmental Services, Sacramento, CA
RWQCB, Oakland, CA
NMFS, Napa, CA
Caltrans, Sacramento, CA

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[8] Fishes associated with estuarine habitats historically provided food for nesting least terns and are known to be essential to current post-fledgling feeding after adult and young birds leave the nest.

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PERSONAL COMMUNICATIONS

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Mr. John Turman, District Supervisor, U.S. Department of Agriculture Wildlife Services, San Diego, California